THE

JOURNAL

OF

GAS LIGHTING,

WATER SUPPLY,

Etc.

VOL. LXXXV.

JANUARY TO MARCH, 1904.

LONDON:

WALTER KING,

11, BOLT COURT, FLEET STREET, E.C.

THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

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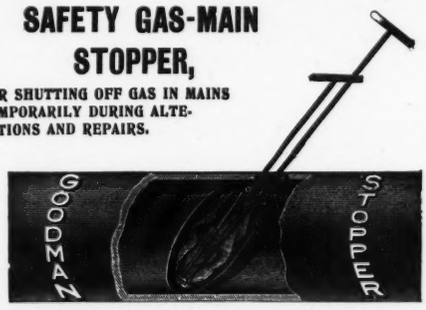

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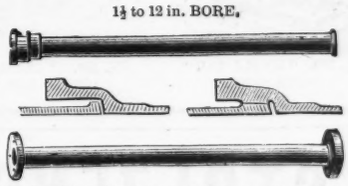

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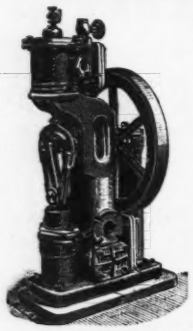

Fig. 705. "SINGLE RAM" STEAM-PUMP.

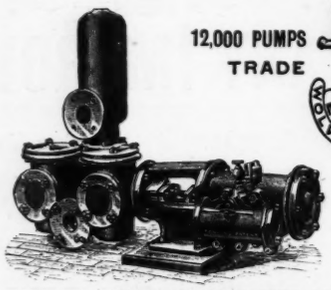

Fig. 598. "CORNISH," STEAM-PUMP FOR BOILER FEEDING, &c.

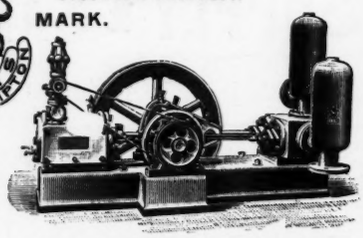

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

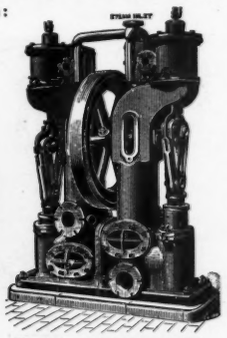

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

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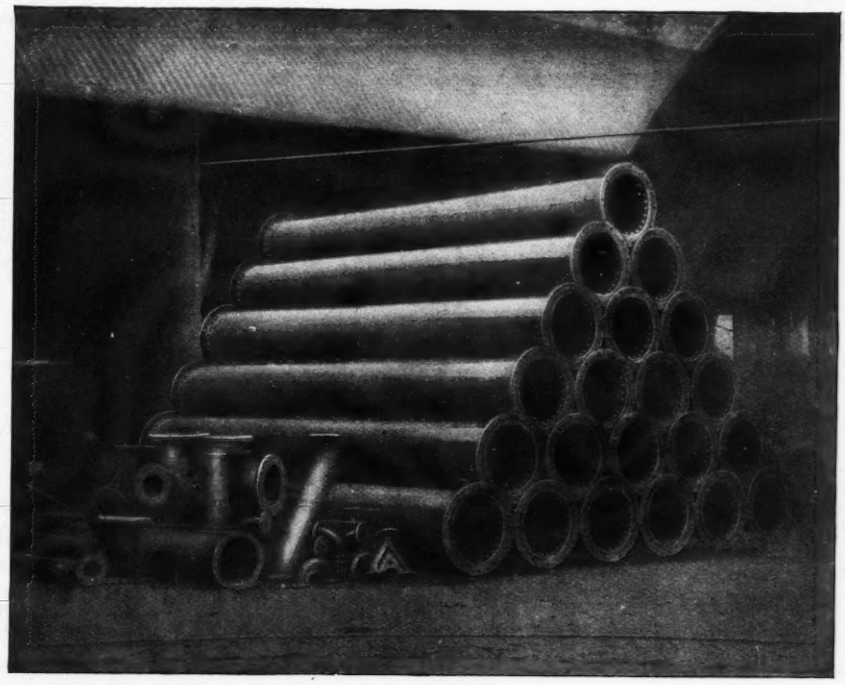

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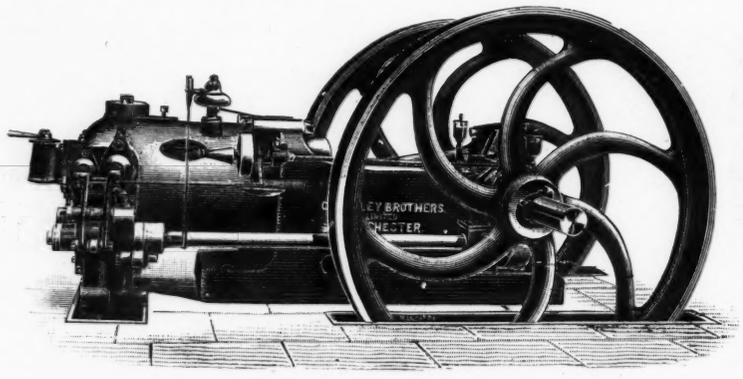

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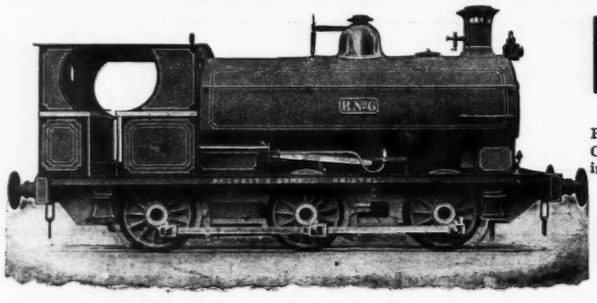

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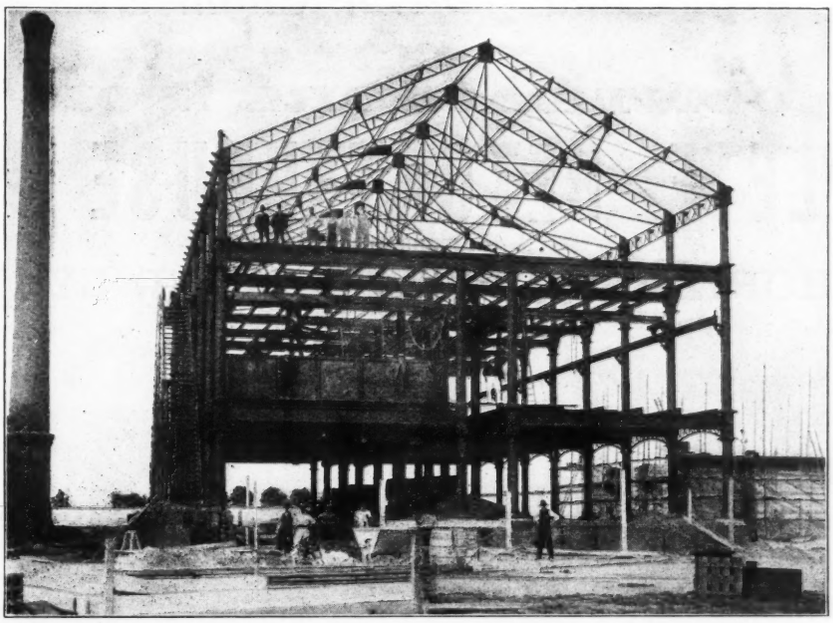

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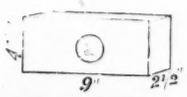

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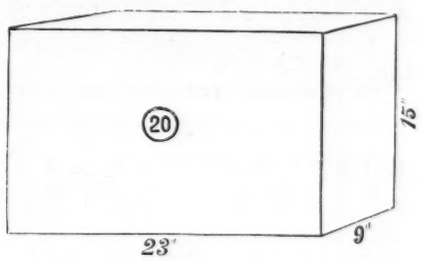

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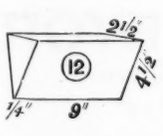

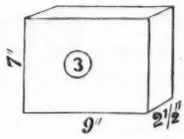

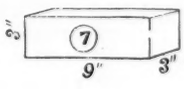

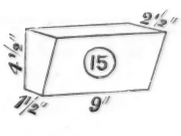

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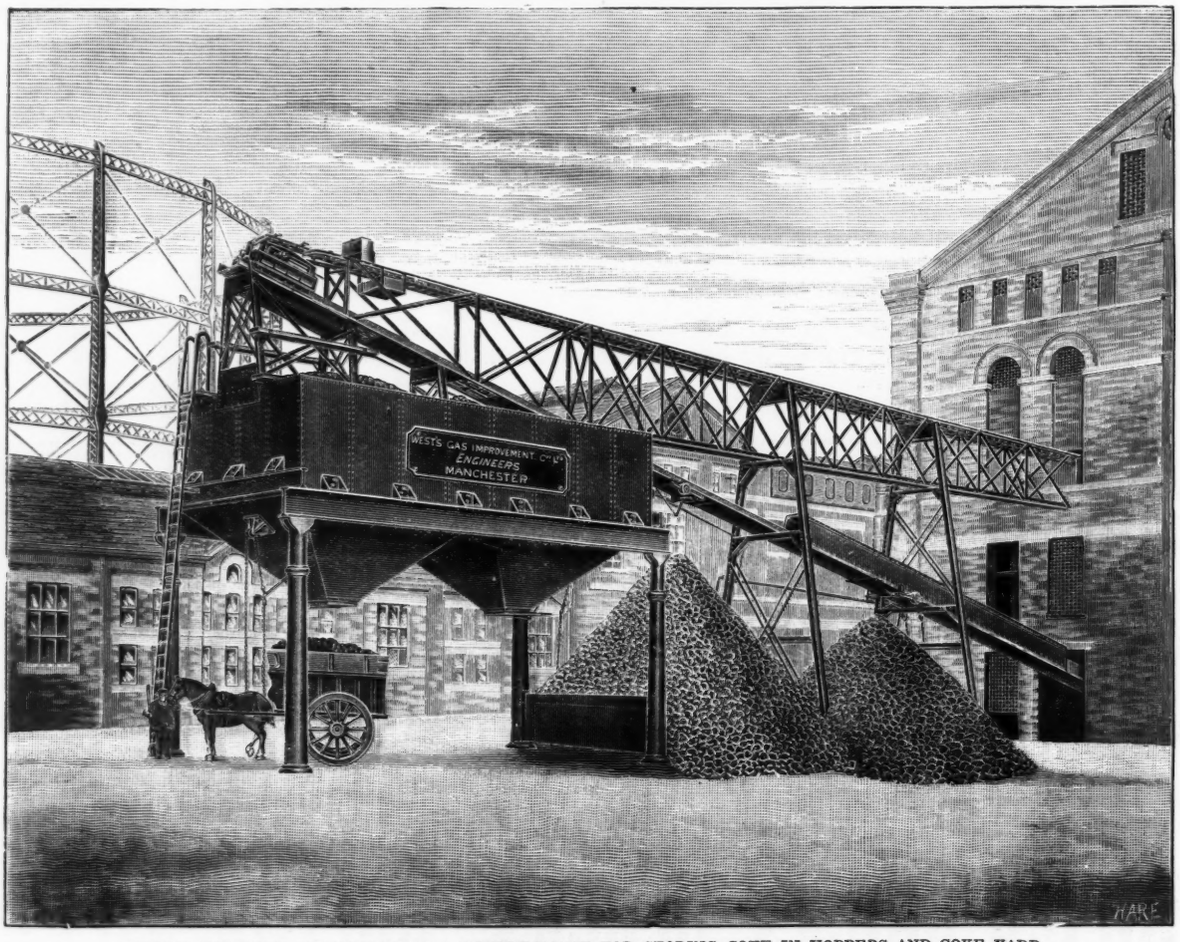

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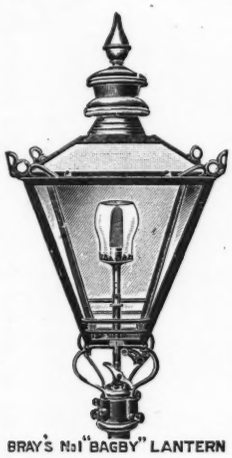

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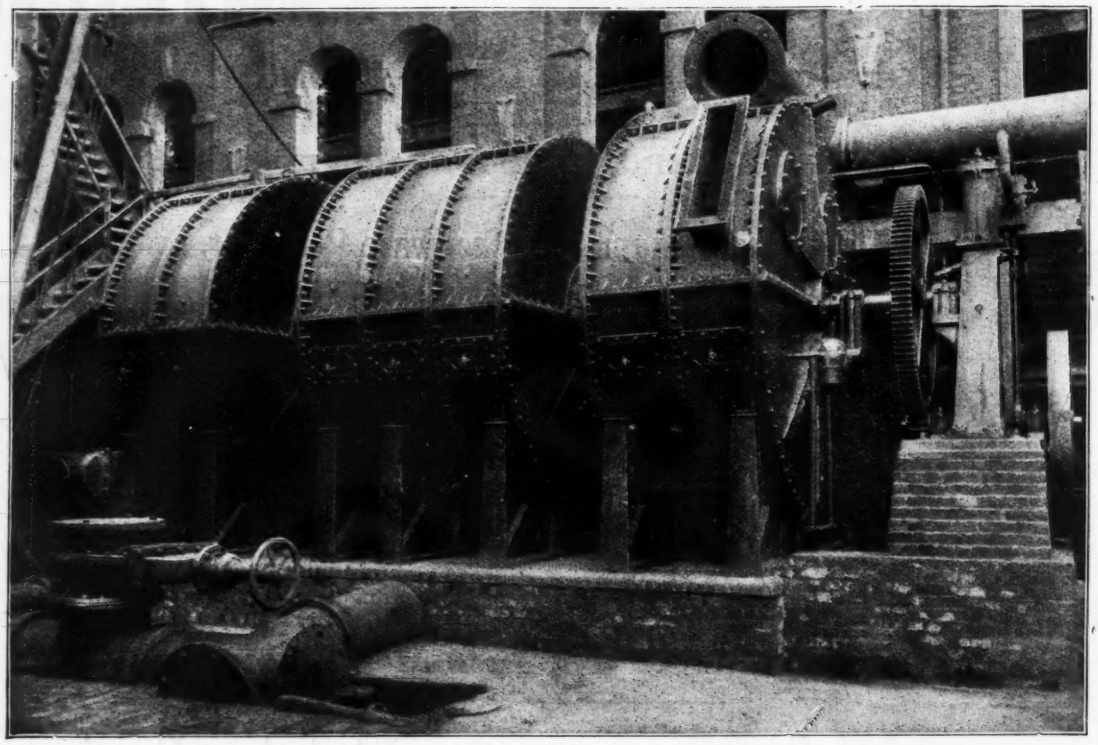

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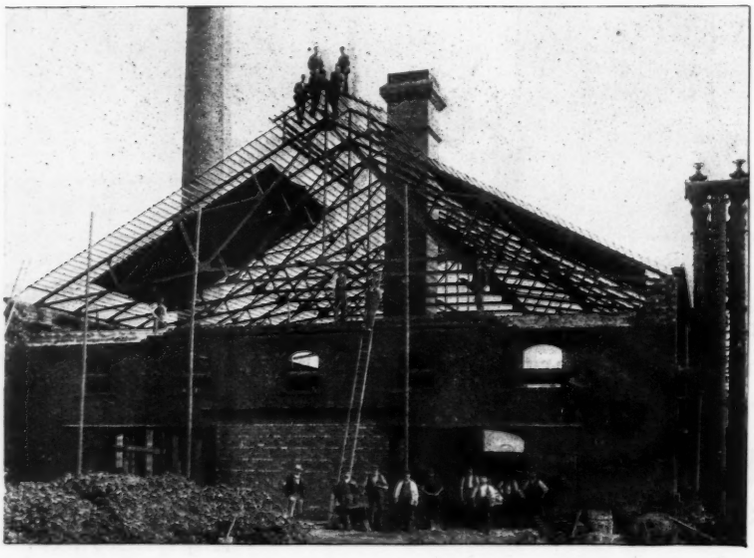

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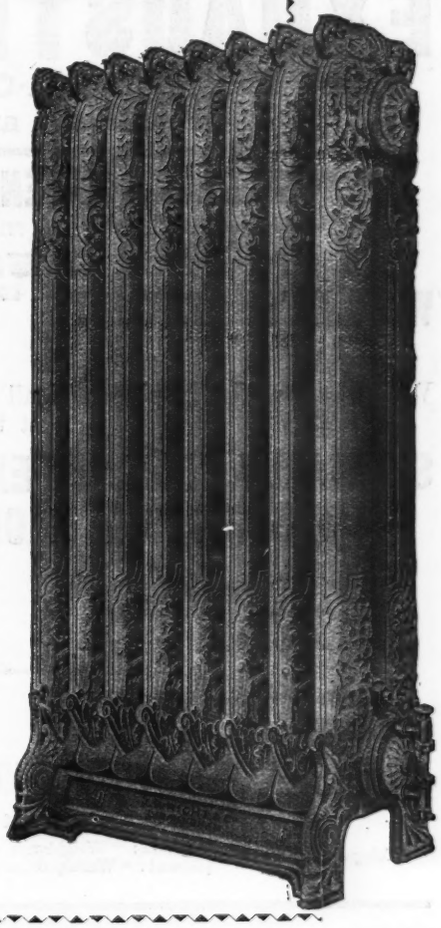

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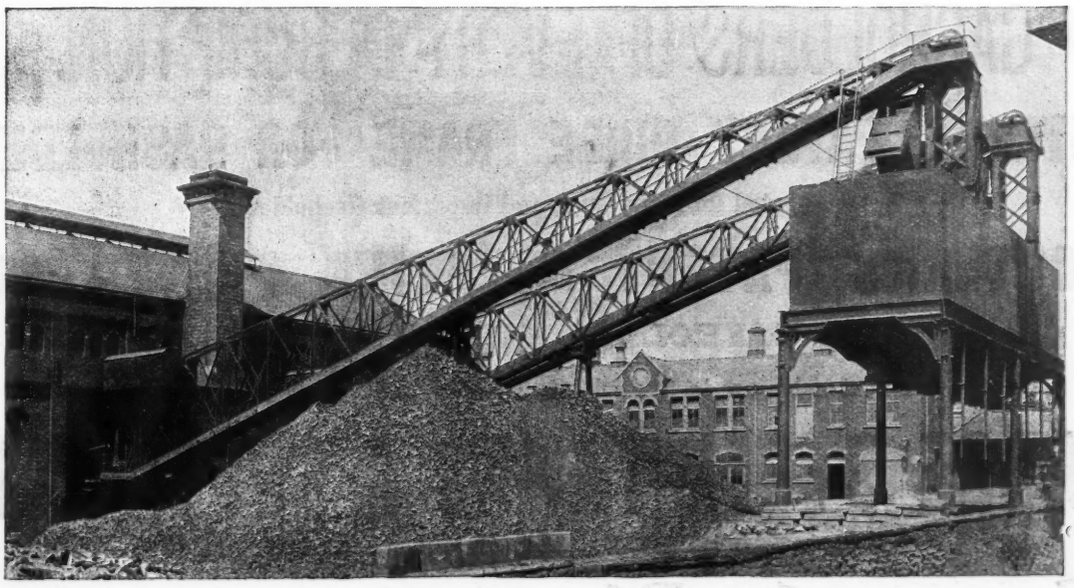

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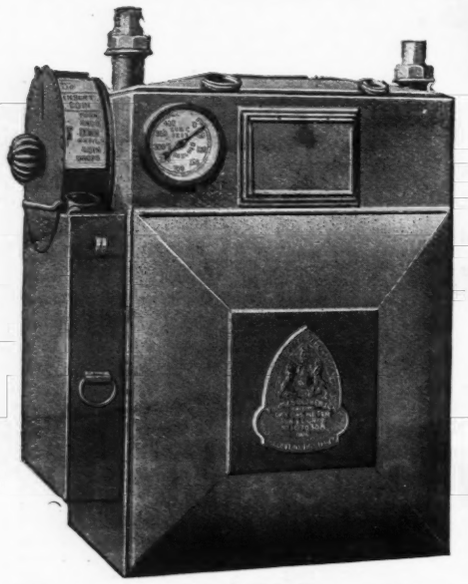

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EDITORIAL NOTES—GAS, &c.

Gas Prices and the Sale of Gas.

IT has been truly observed by the wise, that a great part of human experience is concerned with the verification of ancient truisms; and that is the main reason why those who have any sort of instructional work to do must often go over the same ground many times. While novelty possesses the greater attraction for those who merely desire a smattering acquaintance with things, the most perfect and thorough knowledge obtainable is only to be had at the cost of incessant revision of the elements which the casual observer is content to take for granted. For this reason we offer no apology for these observations, which will deal simply with the familiar subject of the price and sale of gas—at once the best worn and the least understood of the topics that go to make up the gas manager's "shop" talk. It seems almost absurd to state that this matter is not generally understood by those who live by the trade; but the most cursory glance over the various conditions under which this trade of selling gas is carried on in different places, will suffice to show that there exists so much diversity of practice in this regard as to admit the suspicion that all cannot be right. In the circumstances, therefore, the opportunity presents itself for a survey of the commercial situation; and this, moreover, happens to exhibit somewhat of a critical aspect. At the present juncture, the British gas industry is actually experiencing a sharper competition than ever arose before, in at least two directions. While cheap electric power and power gas challenge its market for this use, electric light offered upon the most attractive terms, and freed from the old obstacles as to interior wiring, &c., competes with gas for the patronage of all classes of the community. This is the state of things before the gas industry at the beginning of a new year. What is the best policy for the industry to follow?

Several answers, which would be both right and wrong, might be given to this searching inquiry. That is to say, they might be right for one locality, and wrong (or at least inapplicable) in other places. Some gas undertakings, both large and small, are still labouring in the ruts of ancient routine and hide-bound prejudice; and for them clearly the first necessity is to "reform" themselves, as Hamlet put it, altogether. But there are others, and those in the great majority, which have done with obsolete conventions, and are only too anxious to comprehend their epoch. The advice we are about to offer to the most advanced of these gas companies may be misunderstood; but we are not unused to this experience. Besides, it is not particularly new, and is certainly not original with the "JOURNAL." It is, briefly, not to repose sole trust in the comparative cheapness of gas, and especially not to reduce the all-round price too readily as a bid for popular favour. It is necessary, of course, to safeguard this advice from appearing to be directed to particular cases. The South Metropolitan Company, for instance, have just announced a reduction in price from 2s. 3d. to 2s. 1d. per 1000 cubic feet, to take effect as from the last index-reading. They are to be congratulated on their spirited action, and also on the strong financial position which has alone enabled them to take it. But their circumstances are exceptional. While recognizing the character of this act of policy, we have to remember the circumstances of the vast majority of gas undertakings at home and abroad to which even a selling price of 2s. 3d. per 1000 cubic feet for 14-candle gas is an unapproachable ideal. If salvation is only to be secured by reducing the all-round price of gas to the new South Metropolitan level, it is a poor look-out for these other concerns. But it is not so in point of fact; and what we now say is that, in the present crisis in the affairs both of gas companies and their rivals, the mere figure at which gas is priced is perhaps of less relative importance than it has ever been in the annals of the industry.

Nor is it at all difficult to sustain this thesis, and thus offer some comfort to the gas companies who, with all the good-will to it in the world, cannot possibly sell gas at the South Metropolitan figure. For it is notoriously true that if the comparative cost to the purchaser of distributed light, heat, or power were everything, ordinary gas of fair quality would beat all rivals—except, in certain circumstances, power gas—even at its European and American prices, which are double and treble those prevailing in the United Kingdom. It does so, as a matter of fact, all the world over. The argument, therefore, comes to this: That if incandescent gaslight, at current British prices, is already one-tenth the cost of electric incandescent light, and if small gas-engines working with the same gas can beat the penny unit of electrical power, how is it that electricity sells at all? Why cheapen that which, in comparison, is already almost too cheap? There must be some preferable course.

There is; and we did not discover it. For, years ago, Herr von Oechelhaeuser pointed out that, even at German prices for lighting gas, electric light was hopelessly beaten in cost to the consumer. He therefore declared it to be his fixed intention to let this fact work its due effect upon the public with the course of time; while he, as a gas administrator, applied himself to developing the estate in other ways. A policy of caution and reserve, in this respect, is also counselled by the knowledge that much of the consumer's saving through the adoption of incandescent lighting is necessarily at the expense of the gas manufacturer. This effect, visible in the check upon the increase of gas sales, has been felt everywhere; but it will continue to be exerted for years to come, until the industry has finally grounded upon the new basis of gas consumption. Meanwhile, therefore, it is highly expedient that most gas undertakings should take the opportunity for strengthening their financial position, if this is necessary, rather than precipitately give away their resources in the form of unappreciated reductions of price. Also, there are many things to be done which will bring in more trade than any possible reduction. The free supervision of incandescent burners, for example, is in this category; and there is nothing more likely to pay in the long run. Experience shows that even the most liberal system of "maintenance" has limitations of acceptability with the public, which might well be swept away at the cost of a small addition to the working expenses. It is in this spirit that the gas manager will be well advised to survey his revenue account—spending preferably in the service of the public the surplus which might otherwise be swallowed up by a reduction of price. In a sense, the matter is as broad as it is long; for if the public receive the money in one way they cannot have it in another. But the balance of advantage to both the public and the undertaking, by improving the general service rather than by reducing the earnings, is within reasonable limits on the side of the former—more especially at the present juncture. Discounts, likewise, can be wisely allowed for the saving of some customers, and the encouragement of others. An electrical contemporary has admitted the difficulty that arises in central station electricity supply, in doing business with the large users of light for a short time of the day—such as big drapers, banks, and so forth. Coming as this class of demand does on the peak of the load, it is precisely the most objectionable of all to the central station manager; and yet the quantity taken may be so large that the customer thinks himself entitled to a good discount. This class of consumption has no terrors for a gas company; and there should be much advantage to be reaped from the circumstance. The foregoing is a sample of the considerations that arise in regard to the selling of gas according to the requirements of the modern market; and we trust that this slight attempt to state in the newest light the problem of successful trade in gas, will not be lost labour.

The Trade of the Past Year.

OTHER technical and trade periodicals than the "JOURNAL" have given their readers their impressions with regard to the course of British business during the past year; and it is rather interesting to take note of some of those which have the closest relations with the fortunes of the gas industry.

Metal prices are reviewed by the "Ironmonger," and inasmuch as the value of coal goes with that of iron, it is significant that, on the whole, the market prices of the leading makes of manufactured iron left off at a substantial reduction from the best figures recorded for the year. The fall was as much as 11s. per ton for Cleveland iron. Common Staffordshire bars at the works were marked down to £6 2s. 6d. per ton, which is the lowest quotation for the past three years. This does not look as if the price of gas coal is likely to stiffen within a month or two. On the other hand, certain cryptic remarks are going the rounds concerning the difficulty experienced by importers of foreign steel in getting rid of parcels. Complaints as to bad quality, unheard before, are being raised; and it is thought more than likely that British steel will occupy a stronger position in the coming year, which will mean an increased demand for oven coke. The chemical industries, selected by Lord Beaconsfield as the best index of the growth of material civilization, continued depressed throughout the year. Chemicals felt the disastrous effects of the cold and very wet summer and autumn; and it is feared that the injury thus inflicted on the unhappy British farming interest will extend into the future. Enormous sums of money must have been lost to the country by reason of the defective crops—wealth which the foreigner was able to gather in. This money will probably be spent again largely for fertilizers, especially sulphate of ammonia, which is reported upon authority to stand in the market at its equivalent chemical valuation with nitrate of soda as a source of nitrogen. This is an improvement for the buyers of sulphate. According to the "Iron and Coal Trades "Review," the coal trade of the kingdom for the year was not marked by much incident. Though prices all round weakened substantially, the market did not undergo great fluctuation. The year closed with a reduction of 5 per cent. ordered by Lord James, the Conciliation Board Arbitrator, for the Federation districts. Whether this will bring about the termination of the Board, which comes up for renewal by efflux of time in March next, is regarded as doubtful; the miners strongly resenting any reduction of wages at all. The same condition of affairs exists in South Wales, where, besides, labour troubles are seldom missed for any length of time. Freights rule low.

The Collapse of the Texas Oil Bubble.

The true situation as regards Texas petroleum has been made a great mystery for some time by certain journals published in England which claim to supply reliable and special information concerning the mineral oil trade; but we have more than once hinted that the key to the truth of this matter was to be sought in the affairs of the Shell Transport and Trading Company, which were unaccountably withdrawn for a while from public observation. It had been proclaimed noisily enough that this Company were to perform for Texas oil the same service they had previously rendered to Borneo oil; but as the year waned, there transpired some ugly rumours to the effect that all was not well with the new fields. Then came the news that the Shell Company had taken a leading part in the formation of a large Asiatic oil "combine;" and this we interpreted at the time as indicating that the management were seeking again in the Old World compensation for a disappointment in the New. The justice of this surmise was revealed at the recent meeting of the Company, which, though belated, was yet only of an interim character. The fact appears to be that the Company have been compelled, in order to preserve their existence, to fall back upon Borneo as their mainstay. As to the Texas episode, the explanation of the Chairman, Sir Marcus Samuel, appears to be as candid and honest as any shareholder could well have expected. A contract was made with the Guffey Petroleum Company, which seemed to justify a large increase of the oil-carrying fleet. Most unhappily for all concerned, the production of Texas oil declined in a manner which no expert could have foreseen; and by the past autumn the falling-off was so serious and fatal that the Shell Company had no alternative but to give up the enterprise. Although the Guffey Company made such offer of compensation as they could afford, the Shell Company were left with a large fleet of tank steamers idle, with others partly finished to pay for. It was not to be supposed that the Shell Company would be content to sit still under this heavy reverse of fortune; and they accordingly bought an interest in the European petroleum trade, with the object of securing employment for such of their steamers as are not wanted for the Borneo traffic. The whole story is a romance of modern industry and commerce which one would scarcely expect to find inside the dry husk of a Chairman's address to a meeting of shareholders. Whatever the issue may be, Sir Marcus Samuel and his colleagues on the Board and in the management of the Shell Company appear to deserve hearty applause for their adept handling of a position of tremendous difficulty; and it is to be hoped that, through their action and for other causes, the result of the collapse of the Texas bubble will not be a permanent increase in the price of petroleum to gas-works and other users.

The "Notification" of the Metropolitan Gas Referees for 1904.

The "Notification" of the Gas Referees for the year 1904 has been issued, and the painful student who carefully searches through it for alterations, to which the modesty of the Referees does not permit them to draw particular attention, will this time discover one or two changes of considerable importance. The first relates to the amount of sulphur permitted in sulphur compounds other than sulphuretted hydrogen, which is now allowed to attain a maximum of 27 grains per 100 cubic feet of gas, whenever the average quantity at the same testing-place for the thirteen preceding weeks shall have been less than 12 grains. There disappears from the "Notification" the remarkable exception made in the last one with regard to the testing of the gas supplied by the Commercial Gas Company; and the wording of the descriptive matter of "Appendix D" therefore reads once more consistently. It is now prescribed that the chimney used with the "London" argand burner No. 1, as standardized, is to be 6 inches long and $1\frac{7}{8}$ inches internal diameter when testing the 16-candle gas of the Gas-light and Coke Company, and 6 inches by $1\frac{5}{8}$ inches internal diameter when testing the gas of the South Metropolitan and Commercial Gas Companies "which are required to "have an illuminating power of 14 candles." If at any time the gas-flame mounts above the top of the chimney, a chimney of the larger dimensions is to be used. The standard burner, as everybody who uses it knows, is made with two concentric galleries to take either size of chimney. The further consequence of this simplification of the prescription is tacitly admitted to be the burning of all three Companies' gases at the 16-candle flame rate, which maintains the relative dimensions of the working parts of the table photometer at the same measurements throughout. The fact might as well have been stated, as making for clearness. As it is, the Gas Examiners are left to find it out for themselves. The essential fairness and scientific uniformity of the new prescription must commend themselves to technicians' appreciation; and one only regrets that an Act of Parliament was required to secure it.

Electricians and Incandescent Gas Lighting.

It has taken some time to persuade those who are concerned in the administration of electric light undertakings, that the rival they have to dread is the incandescent gas-light. Signs are multiplying, however, to show that the hollowness and futility of "making believe" that gas is never employed for lighting purposes except by the means of very bad flat-flame burners, always consuming 5 cubic feet per hour, is being borne in upon reluctant electricians. A contemporary writer upon matters electrical has even admitted that it is incandescent gas which ultimately rules the price of the unit for electric lighting. He confesses that the incandescent gas-mantle has been much decried by electrical engineers, and affects to think that "a few years "ago the rate at which it deteriorated lent some force to "such argument." A few years ago, however, the electricians who recognized the existence of the incandescent gas-mantle were few; the majority of the profession keeping their thoughts about it strictly to themselves. It is no longer possible to sustain this know-nothing pretence; and to-day the electricians admit that the only serious competitor with incandescent gas is the electric arc. "Incan-"descent electric and Nernst lamps suffer from the dis-"advantage of having so little to show for the money. "The thin, dazzling filaments do not offer a sufficient

" surface to appear bright at some distance away. What-
" ever photometrists may urge to the contrary, the appear-
" ance of the street to the eye is the criterion adopted by
" the man-in-the-street, who has to foot the bill." This is not gas-engineering opinion, be it noted, but the observation of an electrician criticizing the lights with which he is expected to carry on business. The remarkable candour of the confession may be taken for a measure of the gravity of the occasion. The small enclosed arc lamp is supposed to be really the only hope of the electric lighting interest against the formidable incandescent mantle. This pattern of electric light is no novelty whatever, and it may fairly be admitted to be the cheapest. Yet it argues a singular barrenness of the contemporary electric lighting industry in invention, to fall back upon this old lamp as the sole means of defence of the industry against a rival which is confessedly being improved out of reach of criticism. In point of fact, it is not so much the material improvement of the incandescent gas-mantle itself that has thus begun to tell upon rival systems of lighting, as the reduction in price of the article, and the fittings, and the way in which the system is being pushed by the gas companies—especially the latter. This, again, is a direct result of the cheapness of the mantles and accessories, because a maintenance policy which would have been less practicable only three years ago is now almost universal.

Signs of Change in America.

There seems to be something about the innocent little twenty-line paragraph that appeared, under the above heading, in the "JOURNAL" for Dec. 1 that has the effect of producing optical delusions in America. What it is we cannot imagine; but the fact remains, as letters in the "Correspondence" columns to-day from Mr. Walton Clark and Mr. Alten S. Miller bear witness. The drift of the paragraph in question was that there are signs that in immediate extensions on the other side "coal gas will have the more prominent part," or, put in another way, will have "a bigger innings in America in the future than it has had for many a long day." These statements have, by some occult power, been magnified in the minds of our correspondents to mean that Mr. John West has some "fear of an oil famine," and that he has "returned to England with the idea that water gas is rapidly becoming a thing of the past in America." These are little flights of imagination that are apt, without warning, to mislead those who have not the original paragraph before them. However, it is supposed that we are to take these letters to be denials that the attention of American gas engineers is being largely directed to coal gas at the present time; but we find nothing whatever in them which contradicts that assertion. The mere mention of certain contracts for water-gas plant for a year having been entered into in America aggregating to between 62 and 63 million cubic feet capacity has not by any means struck us dumb with astonishment, nor does it controvert the statement that in America there are increasing inquiries being made in connection with coal-gas plant. The statement of that total may mean little or nothing as an indication of a general change of attention or view, under existing conditions, on the part of American gas engineers—taking into account the extent of interested control that exists in that country. Mr. Walton Clark very considerately palliates Mr. West's asserted erroneous impressions with the remark that "quite naturally he (Mr. West) was in the way to hear talk of coal gas rather than of water gas, and the bent of his mind appeared to be somewhat towards coal gas." Very true; and, that being so, Mr. West was in a position to learn the facts as to whether there was or was not an increasing inquiry in connection with coal-gas plant. Perhaps the author of the words above quoted will pardon a little alteration of terms, and permit us to say that "quite naturally Mr. Walton Clark is in the way to hear talk of water gas rather than of coal gas, and the bent of his mind appears to be somewhat towards water gas." The words seem to fit well. In the first part of his letter, Mr. Clark casts doubt on the correctness of the statement made by Mr. Charles Carpenter at the Southern Association meeting last November. Mr. Carpenter was quite accurate in his statement, it being merely the relation of information received from an American gas engineer. Whether the American gas engineer was correct is quite another matter. But here we are placed in a dilemma by the fact that, if the engineer in question is the same one who gave expression to somewhat similar views at the office of the "JOURNAL," that gentleman is of repute equal to that of Mr. Walton Clark, which is not a statement to the latter gentleman's discredit. Who, then, is right?

The Question of Oil.

Inasmuch as Mr. Walton Clark is unable to find any evidence that Mr. Carpenter is correct in his statement, as he understands it, it is "unprofitable"—so says Mr. Clark—for him to discuss the cause of the condition which Mr. Carpenter asserts exists. We must totally disagree with Mr. Clark there; and say that such a discussion would have been, from our point of view, most profitable. It is easy to understand that it might be both unprofitable and improper for Mr. Walton Clark, considering his commercial relations, to discuss "the autocracy of the Standard Oil Company in the American oil market," but we will gladly put space at his disposal if he cares to show us that herein we are mistaken. The rest of his letter is interesting, but it does not go far enough. Gas-works on this side are not altogether without experience of the American oil market; and Mr. Walton Clark may understand what is meant by "not going far enough" when we say that certain contracts for American gas oil to English gas-works are now running, and for a time the class of oil contracted for was delivered. Afterwards that oil could not be procured, and a different kind crossed the Atlantic. It was found (so trustworthy report states) to be such "poor stuff" that Russian oil is now under trial. Why is this? Unreliability of this kind does not build up confidence; but anyone would think from Mr. Clark's letter that the condition of the American oil market at the present time is as sound as anything could well be. There is something more to be stated beyond what appears in his communication. In conclusion, let us put the position clearly, apart from the question of oil: Signs are not wanting that greater attention is being given to coal-gas plant in America than has been extended to it for many years past. That is a plain and definite assertion. Do Mr. Walton Clark and Mr. Miller dispute it?

The End of the Welsbach Reformation Scheme.

Two years precisely have passed over the Welsbach Company since the issue of the famous report of the Advisory Committee, which told the shareholders, in unvarnished language, that their concern was little short of the brink of destruction through a long course of maladministration, and that nothing but radical and severe measures, amounting to a retracing and wiping out of false and prodigal steps, would bring it to a sound commercial state. The report reached the proprietors at the close of the year 1901. By a coincidence the end of the year 1903 saw the completion of the drastic proposals then made. The two years that have elapsed have been years of stress and anxiety for all concerned in the management of the Company; and it will be an encouragement to the proprietory who have supported the Board (and surely also to the few others who have placed opposition in their way) to know that they have at the head of affairs men, who through good report and ill, and faced by vexatious antagonism, have stuck so tenaciously to the objects which they were expressly appointed to carry through. On almost the last day of the past year, it was the pleasure of the Board to inform the proprietors that the judgment of Mr. Justice Buckley, in connection with the scheme for the reduction and reorganization of the Company's capital, having been affirmed by the Court of Appeal, and further opposition having since been abandoned, they were able to proceed with the reorganization, and would issue without delay the new securities. The intelligence which accompanied this notice will also have been received with the greatest satisfaction—that, at the earliest possible date after the close of the Company's financial year on March 31, the Board will issue the report and balance-sheet, and hold the annual general meeting, at which they will submit such recommendations with regard to dividends as the profits, when ascertained, may justify. The retardment of this happy stage has not been due to any action of the Board, but to the imprudent hostility they have had to encounter. However, the large majority of the proprietors who have been faithful to those to whom they confided an exceedingly onerous and difficult task can now afford, so far as that opposition is concerned, to let bygones be bygones.

A Notable Reconstruction.

In the plans to resuscitate the good fortunes of the concern, the one which, of sheer necessity, produced the reduction of the capital to the tune of £2,135,563, has placed the Company in a remarkable position in the history of reorganizations of industrial enterprises. It is not by any means an enviable position; but at the same time it brings into strong relief the extraordinary reliance of the proprietors in the men who proposed that they should occupy it, in order to attain the correlative state of prosperity which could not be reached by any other way. The "Pall Mall Gazette" has pointed out that the Welsbach case forms one of six notable reconstructions of the past year; and it will therefore be of interest to reproduce, for comparison, the table which our contemporary published, showing the extent to which the capital of the half-dozen concerns referred to have been reduced.

	Old Capital.	New Capital.	Reduction.
Allsopp and Sons	£6,151,500	£4,721,500	£1,430,000
Ebbw Vale Iron	1,712,925	968,175	744,750
Homocea	250,000	60,000	190,000
Salviati, Jesurum, and Co.	330,000	60,900	269,100
Singer Cycle	800,000	285,000	515,000
Welsbach Incandescent Gas-Light	3,590,000	1,454,000	2,135,563

In point of amount, our evening contemporary remarks, the Welsbach reduction "comes an easy first, followed by the Allsopp Company. Based on relative reduction, however, the Salviati-Jesurum reorganization was by far the most drastic. Reconstructions are not things shareholders particularly crave after, of course; but, in the cases mentioned, it was the only remedy that could possibly restore the finances of the different Companies to anything like a sound condition." However, as already said, this is the end of the Welsbach reformation scheme; all that is wanted now is the continuance of the present good direction. And the proprietors will do well to use every endeavour to retain it. The members of the Board have proved themselves excellent in business resource and application; and they have won the confidence of those whom they have served with such conspicuous zeal. Resource, application, confidence, and zeal are all things which will be required to keep the Company at the head of the incandescent trade in this country.

Some Statistics of Gas Consumption.

The advantages that must accrue from visits of inspection to gas-works other than his own, are so generally recognized that the Gas Manager Abroad is quite a familiar figure. Besides the benefits which the traveller himself must derive from his search after knowledge, the publication of his seeings and doings, and the results of his inquiries, are also of great assistance to his professional brethren. It is therefore always a pleasure to receive particulars of such visits; and this week we are gratified to be able to give some account of a tour of inspection through several of the countries of Europe made early last year by Herr O. Mœgelstue, the Engineer of the Christiania Gas-Works. The statistics which he has compiled are of a varied character, and indicate that those connected with the gas industry in England have very considerable grounds for satisfaction. In the production per head of the population of the towns supplied with gas in the countries with which he deals, England comes a long way first; Newcastle being far ahead of London, Manchester, and Liverpool in this respect. In Newcastle, the present annual production is about seven times greater per inhabitant than at Christiania. Some idea of the relative sizes of the works, too, will be gathered from the statement that the annual output from Beckton alone is about sixty-six times as great as that at Christiania. As might be expected under these circumstances, it will be found that the price charged is lower in this country than in the Continental towns referred to. Christiania has the smallest number of meters out in proportion to the inhabitants; but then, as a set-off against this, the consumption per meter there is much larger than in any of the other towns with regard to which figures were obtainable. The table having reference to prepayment meters shows how rapid has been the growth in popularity of this system, though the fact of different years having been taken prevents a reliable comparison in this respect between one town and another. The single point where England does not show up well is street lighting; but perhaps this will be altered in time. Herr Mœgelstue gives it as his opinion that Manchester, except in some of the principal streets, is badly lighted; while London is in this regard the best off of English towns. This view, however, does not altogether square with that of the deputation from Glasgow who have lately been making an inspection of the public lighting in different parts of the kingdom, and who are reported to have found that Liverpool was entitled to rank with certain districts of London in the matter of the best street lighting.

Prepayment Meter Practice.

In view of the contemplated adoption of the prepayment system at Oldham, the General Manager, Mr. Arthur Andrew, obtained information from a number of towns with regard to the conditions under which such meters are fitted up. In Oldham, it should be remarked, all the meters at present in use (over 53,000) are provided by the property owners; and this fact, of course, has an important bearing upon the question of the introduction of the prepayment system. After considering the particulars received from fifty other places, the Corporation have decided not to relieve the property owners of their obligation to provide ordinary meters, and only to furnish prepayment ones in the instances in which tenants would not otherwise consume gas. In the great majority of the towns referred to, ordinary meters are provided by the gas suppliers; but in seven cases the property owners or consumers put them in at their own expense. The replies to the question: "Do you supply prepayment meters to all consumers who ask for them, if there is already an ordinary meter on the premises?" show how widely divergent is the practice in different towns in regard to this matter. In about one-third of the places from which answers were received, a charge is made for exchanging an ordinary for a prepayment meter, and even then in some cases the change is only made after due consideration; while in only thirteen instances are prepayment meters supplied unconditionally to all ordinary consumers who ask for them. Of course, towns where ordinary meters are furnished by the property owners and consumers are on quite a different plane to the others; and it is interesting to note what their experience has been. In three cases where the property owners provide most or all of the meters, prepayment meters are supplied by the undertaking to all who ask for them. In one instance, this has not apparently caused the owners to cease providing ordinary meters; in the second, it has had this effect; while in the third, it has resulted in a few owners insisting on consumers having prepayment meters. In the remaining four cases, automatic meters are not supplied to all consumers who ask for them. One of the latter undertakings, however, is willing to furnish a prepayment meter rather than lose a consumer; while another makes it a rule not to fix a prepayment meter in new property where there is no ordinary meter.

A Point on Municipal Insurance.

The recent lamentable fire at the Bristol Corporation Electricity Works (which entailed such serious loss on the shopkeepers, coming, as it did, when they were busily engaged reaping their Christmas harvest), serves to emphasize a point which was made in the report noticed in last week's "JOURNAL," of the City Lands Committee of the Corporation of London, regarding the suggestion that a municipal insurance scheme for the buildings within their area should be started. Their decision, it will be remembered, was adverse to the proposal; one of the grounds on which this conclusion was arrived at being that there might be a substantial loss before a sufficient reserve had been accumulated to meet it. The fact has been called to mind by one of the local papers that some two or three years ago it was suggested that Bristol should follow a plan which has been advocated in many quarters, and insure its own property by the building up of a fund of its own; and it is pointed out that if this course had been adopted there would, at the time of the fire at the electricity generating station, have been only the two or three years' saved premiums wherewith to meet the loss. This case, of course, strikes at the very root of the whole matter. It is just in order to provide against such a risk as has here materialized that persons are willing to pay premiums to insurance companies on their lives and on their property. No man if he knew that he was to enjoy a long life, or that no fire would take place on his premises for many years to come, would need to pay these premiums rather than form a fund of his own. It is precisely because he does not know these things that ordinary prudence

leads him to take out policies with companies who, solely owing to the law of averages, are able to guarantee him the protection which he desires. What has happened at Bristol might just as easily occur elsewhere; and if it should, the sufferers will be fortunate if they, like Bristol, are able to look to the insurance companies to make good their loss, instead of only having a fund of their own to depend upon, which may not have had time to grow to substantial dimensions.

WATER AFFAIRS.

The Outlook.

It does not require the possession of unusual powers of vaticination to enable anyone who has followed the Metropolitan Water Question through its various phases to predict that the year upon which we have just entered will be an eventful one for both the consumers and the ratepayers. In a few months, Midsummer Day—the "appointed day," in the words of the Metropolis Water Act, 1902—will be reached; and, judging of the future by the past, by that time all the awards in the pending arbitration proceedings will have been made, and Londoners will know how much they will have to pay for the undertakings for the possession of which certain of their representatives have for so long been clamouring. If they have been indulging in the hope that by persistently depreciating the Companies' properties and the article they purvey, the works and business would be secured for a mere song—and this would appear to have been the idea, from the amounts offered for them—we fear they will find that they have been egregiously misled. With regard to the quality of the water supplied to London, never was an opinion more explicitly stated than it was by Sir Edward Fry in his remarks prior to announcing the award in the East London Company's case The Arbitrators were bound, he said, by the evidence produced before them, to hold that the waters of the Thames and Lea were capable of being supplied in "excellent condition for domestic purposes." These remarks, it is true, were made with reference to cases which had been heard; but we hold the confident belief that they will be justified in those which have still to be investigated. As to the works, the three awards already given, supposing the Companies concerned fail on the point of law reserved for the Court of Appeal, total up to £10,773,500, which is £523,500 more than the Water Board offered for the properties of the six Companies whose works they considered would be of any use to them. As the announcement of the awards was followed by a rise in the stocks of the respective Companies, one may safely conclude that they were not regarded in the City as unfavourable. From the remaining sellers' standpoint, therefore, the outlook is certainly not a gloomy one. We will not venture to suggest how the buyers regard the prospect. The Water Board have already borrowed £130,000 from the Bank of England; and they are spending heavily on the arbitrations. It is early to forecast the economy likely to result from concentrated management of the undertakings; but we are afraid it will not be so considerable as people have been led to expect.

Apart from the Water Question, there are a few subjects which it may be supposed will engage attention in the twelve months before us. The opinion is rapidly gaining ground that some of the work of the Local Government Board might with advantage be placed in the hands of a new authority. In certain quarters it is thought that this body should be entrusted with all matters bearing upon public health, very much as is the case with the State Board of Health of Massachusetts. If such a Board were constituted, the purification and conservation of rivers and the protection of sources of water supply—two subjects which have lately come prominently forward—might be brought within its purview. The need of such an authority, in connection with the first-named subject, has been recognized by the Royal Commission on Sewage Disposal; and it is not improbable that some further reference to it may be made in their next report. If it were possible to relieve the Board of some of their duties, opportunity would be afforded for directing attention to matters which certainly call for reform. One of these—their arbitrariness in connection with water engineering works—was mentioned in our columns last week. Another subject of which something more will assuredly be heard in the course of the year is the training and registration of plumbers and the standardization of fittings, water-supply bye-laws, &c. This matter is in the hands of a strong Committee; and if the only outcome of their labours is the checking of the lamentable waste of water which now goes on, one great object will have been accomplished. But we look for more than this. We hope they will be able to formulate a set of regulations which will have the effect of placing water-fitting work generally upon a much higher level. The parliamentary outlook does not give promise of any very exciting contests. Possibly an addition may be made to the number of Joint Water Boards, by the constitution of one for Oakengates, Dawley, and the district; and something more may be heard of the proposals of the Norwich Corporation and the Gosport District Council to acquire the properties of the two local Companies, who will both be in Parliament. But the objects sought to be attained by most of the Bills will not provoke violent opposition.

Relation of Forestry to the Flow of Streams.

The afforestation of watershed areas is a subject to which some prominence has been given during the past few years, owing in large measure to the publicity accorded to it by Mr. Joseph Parry, the Water Engineer to the Liverpool Corporation, who read a paper dealing with it at the last meeting of the British Association. Our readers are aware that this question is receiving attention on the other side of the Atlantic; and one branch of it which appeals directly to water engineers—the relation of forests to the flow of streams—has lately been investigated in Wisconsin and Illinois by the Bureau of Forestry. The origin of the inquiry, as we gather from the "Engineering Record," was the apprehension caused by the gradual drying-up of streams in the Wisconsin watershed, which is not only relied upon by millowners, but is likewise a popular summer resort; and Mr. G. F. Schwarz undertook to make a survey of the Rock River basin, with the view of ascertaining the cause. It appears that since 1885 there has been a trifling decrease in the rainfall, which has slightly reduced the total volume of the river's discharge. But the greatest changes observed have been caused by the largely increased range of fluctuations in the flow of the stream in consequence of artificial drainage and alterations in the character of the forests in the region.

The watershed examined extends over 3635 square miles; and the geographical conditions are specially favourable to an ample sustained flow of the river. The changes noticed must therefore be attributed to surface causes, the most marked of which are the drainage of swamps and the altered character of the forests already alluded to. The first of these tends to prevent the slow percolation of the rainfall through the soil; and inasmuch as half the forests in the watershed have been replaced in the past sixty years by drained farm lands, it is pretty evident that the fluctuations in the bulk of the stream are attributable to the felling of trees. The second cause of the altered flow of the river is the change in the soil cover due to the diminution of forests. The evaporation in a forest is only from one-fifth to one-half that which is noticeable on open ground; and consequently a much larger proportion of the rainfall sinks into the earth there than in the fields. The water gradually percolates towards the watercourses, and the entire forest area becomes naturally a ground-water reservoir for the streams and a regulator of their flow as well. At present, about one-third of the watershed examined is covered with trees; but they are in a condition which not only militates against their usefulness for the latter purpose, but also prevents them from being of their greatest value to their owners. Mr. Schwarz thinks that if these can only be persuaded to restore the normal forest conditions upon their individual properties, for the sake of the resulting profit to themselves, a marked improvement in the flow of the river would follow. The advice is good; but the trouble, it seems to us, will be to restore the "normal forest conditions."

The subject of afforestation has in England an æsthetic as well as a utilitarian side; and Lord Meath, the Chairman of the Metropolitan Public Gardens Association, has lately directed attention to it in a letter to "The Times." It appears that an Association has recently been formed in the Midland Counties with the object of promoting the re-afforesting of the waste lands, pit tips, and "spoil" banks

of which the area known as the Black Country so largely consists. It is calculated that upwards of 30,000 acres of land have been converted into waste heaps, and that about half of the area is lying idle, as "spoil" is no longer tipped thereon. Lord Meath pleads for the utilization of this area by the planting of trees there. Though pit and surface mounds are altogether unsuitable for gardening purposes, it is quite possible for trees of certain kinds—such as pine and spruce—to thrive on pit waste, furnace slag, and the ashes of burnt-out shales. It is stated upon good authority that, without great outlay, many of the mounds already referred to could be so treated as to be made to grow sycamore, lime, beech, and ash trees. If this is so, a large area at present lying waste might, without great initial cost or expensive maintenance, be in due time rendered commercially productive. Trees, with their ever-varying foliage, would, as Lord Meath points out, "refresh and gladden the eyes of people "who at present have no better outlook than barren waste "heaps." But besides replacing ugliness by beauty, the trees would assist in purifying the atmosphere by absorbing deleterious gases and throwing off in return the vitalizing element of pure oxygen. With last year's abnormal rainfall fresh in our recollection, we need scarcely consider the effect of tree-plantingon underground watercourses; but if, in addition to purifying the air, it should add to the stores of water in the earth by checking evaporation from the surface, the Association to which Lord Meath calls attention assuredly deserves encouragement.

The Bequests of the late Mr. John Reid, of Edinburgh.—The death occurred early last month of Mrs. Reid, of Leith, the widow of Mr. John Reid, who was for many years Manager of the Edinburgh and Leith Gas Company, and was President of the North British Association of Gas Managers in 1868. As the result of her decease, the mutual trust disposition and settlement of her and her late husband comes into operation. It provides for the payment of certain legacies to relatives and friends, and of a legacy of £1500 to establish a bursary in the University of Edinburgh for the encouragement of the study of civil and practical engineering, to be called "The Reid and Thomson Bursary."

High-Pressure Distribution of Gas to a Distance.—The report of the proceedings at the last meeting of the Association of Gas and Water Engineers of Lower Saxony, published in a recent number of the "Journal für Gasbeleuchtung," contains an account by Herr Hase, the Manager of the Lubeck Gas-Works, of the supply of gas therefrom to Travemünde—a place upwards of 12 miles distant. The main which conveys the gas is of Mannesmann tube, 3·15 inches internal diameter and 12 miles 176 yards in length. It was tested and found perfectly sound at a pressure of 394 inches of water. The communities of Schwartau and Pöppendorf, which lie on the line of route, are also supplied from this main. The gas is forced from the Lubeck works into holders at each of the places supplied, and distributed locally. It has been found necessary that the gas pumped into this high-pressure main should be freed from naphthalene; it is therefore passed through a washer four chambers of which are charged with oil. Only two had been devoted to oil washing at the Lubeck works prior to the introduction of this high-pressure supply. The price charged for the gas at Travemünde is 5s. 8d. per 1000 cubic feet when used for lighting, but only 4s. 3d. when employed for cooking and heating purposes.

Glasgow Gas-Works Appointments.—The Gas Committee of the Glasgow Corporation last Tuesday agreed to recommend the Council to make the following appointments: Assistant-Manager, Mr. James Lowe; Station Manager at Dawsholm, Mr. Andrew M'Leod; do. at Tradeston, Mr. Alex. Smith; do. at Provan, Mr. John Webster; Engineer's Assistant in charge of the drawing office, Mr. J. F. Harrison. Mr. Lowe has been for five years an assistant in the General Manager's office. He is an associate member of the Institutions of Civil and Mechanical Engineers. The salary is to be £300 per annum. Mr. M'Leod has been for seventeen years employed in the gas-works at Dawsholm, and for the past few years has been Assistant-Manager there. He is a mechanical engineer. The salary is to be £350 per annum. Mr. Smith has for a number of years been an assistant in the Engineer's and General Manager's department. He is a practical mechanical engineer, and took charge of the work of the department between the death of Mr. Foulis and the appointment of Mr. Wilson. His salary is to be £400 per annum; and in view of the extra services he has rendered, it is to date from the time of Mr. Foulis's death. He is a son of Mr. A. Smith, of Aberdeen. Mr. Webster, who has been for some years head foreman at the Dalmarnock station, and was recently transferred to Provan, is also a practical mechanical engineer. The salary is to be £350 per annum. Mr. Harrison is a member of the Institution of Civil Engineers, and has been for nearly five years an assistant in the drawing office.

THE HEMINGWAY SULPHUR-RECOVERY PROCESS.

A NEW method of dealing with the foul gases which are evolved from the saturators in the manufacture of sulphate of ammonia was referred to in last week's "JOURNAL," p. 820, as having been devised some time ago by Mr. H. W. Hemingway (English patent No. 9432, May 4, 1899), and as having recently been submitted to careful examination. The process is worthy of further notice, as it is characterized by the extreme simplicity of the plant required to work it, and by the fact that scarcely any reagent which is not always at hand on a liquor or acid factory, is needed. Moreover, reference to what follows will show that, although the final results of the process remain as they were described last week, the individual stages of the operation have been somewhat modified since the patent was granted. The sulphurous anhydride is now apparently intended to be made by burning the residual sulphide of iron—when it cannot be obtained from adjacent pyrites or oxide furnaces—and not by passing any part of the sulphuretted hydrogen through a fire.

Chemically speaking, the plan adopted consists in causing the well-known decomposition between sulphuretted hydrogen and sulphurous anhydride to take place quantitatively throughout the whole period of liquor distillation, irrespective of the amount or concentration of the gas that may be coming from the stills at any moment. This is effected by using certain iron salts in one or more scrubbers through which the vapours are passed. The above-mentioned reaction—

$$(1)\quad 2H_2S + SO_2 = 3S + 2H_2O$$

can only remove the whole of the sulphur from the gases provided they are mixed together in the precise quantities necessary —*i.e.*, two volumes of sulphuretted hydrogen and one of sulphurous anhydride. Moreover, the action is not quite as simple on a large scale as the equation represents, for a small amount of thiosulphuric acid is formed. The novelty in Mr. Hemingway's process, therefore, comes in in the roundabout scheme he has imagined for having at all times in his recovery plant some substance which is capable of retaining either of the gases that may be in excess, and of holding it until that excess is destroyed by the arrival of a sufficient quantity of the other.

The reactions involved are as follows: When sulphuretted hydrogen is brought into contact with ferrous sulphide, the gas is decomposed, yielding free sulphur and ferrous sulphide—

$$(2)\quad FeSO_3 + 3H_2S = FeS + 3S + 3H_2O.$$

When sulphurous anhydride is brought into contact with ferrous sulphide, particularly the ferrous sulphide produced in (2), the gas is decomposed, yielding free sulphur and ferrous thiosulphate ("hyposulphite")—

$$(3)\quad 2FeS + 3SO_2 = 2FeS_2O_3 + S.$$

Now, if this ferrous thiosulphate meets a further amount of sulphuretted hydrogen, the gas is also decomposed, just as it was by the original ferrous sulphite; ferrous sulphide and free sulphur being formed, probably thus—

$$(4)\quad 2FeS_2O_3 + 6H_2S = 2FeS + 8S + 6H_2O.$$

In plain language, if a suitable purifier is charged with damp ferrous sulphide obtained by precipitation, or by reduction of a sulphite, the purifier will extract an indefinite quantity of sulphur from the gases passed through it, if the gases are sometimes sulphuretted hydrogen and sometimes sulphurous anhydride; the material being changed into the condition of ferrous thiosulphate by the latter, and back again into sulphide by the former—sulphur being thrown out in the elemental state by both reactions.

In order to carry out the process on the large scale, a supply of sulphurous anhydride is required. This is obtained either from the pyrites or spent oxide burners of the adjacent acid plant, or, if sulphuric acid is not made on the works, from an apparatus specially erected to consume the excess of ferrous sulphide produced by the recovery operations. Part of this sulphurous anhydride is led into a separate saturator containing ammonia, where a solution of ammonium sulphite is formed. The liquid is then caused to react with a solution of ferrous sulphate, a solution of ammonium sulphate being produced together with a precipitate of the somewhat insoluble ferrous sulphite, which remains in suspension. This reagent is pumped into the upper part of the absorbers. The rest of the sulphurous anhydride is allowed to enter a chamber on the main leading the foul gases from the saturators to the absorbing towers, where it comes into contact with the sulphuretted hydrogen. In this vessel, reaction (1) occurs; and a good deal of the gaseous sulphur appears in the solid state. The liquid from this chamber passes to a tank containing scrap iron, which decomposes the thiosulphuric acid completely, yielding more free sulphur and some sulphuretted hydrogen. The sulphuretted hydrogen finds its way to the scrubbers, while the iron salt which is the bye-product of the reaction, is eventually incorporated with the other ferrous liquids. Whichever of the two gases was in excess in the first chamber, proceeds to the base of one of the scrubbers, up which it travels (meeting the descending sulphite, sulphide, or thiosulphate of iron), and where the whole of its sulphur is retained.

In practice, two scrubbers are always at work; and the sulphuretted hydrogen is kept in excess in the empty reaction chamber.

While the ferrous salts are absorbing this, and being gradually converted into sulphide, sulphurous anhydride is being introduced into the second scrubber, and the ferrous thiosulphate is being converted into sulphite. After a certain time, the position of the two scrubbers is reversed, so that sulphurous anhydride is led into the first and sulphuretted hydrogen into the second. In fact, as soon as one absorber is temporarily saturated with one of the gases, it is regenerated by treatment with the other, and thus the process of sulphur extraction goes on without intermission. Alternatively, it would seem that the two scrubbers might be worked together "in series;" the gases being permitted to mix before entering the first, and an intentional excess of sulphurous anhydride being periodically employed. In this fashion, the second scrubber would be treated alternately with one or other of the gases—*i.e.*, with whichever was in excess in the first; and thus the second absorber would be constantly undergoing "regeneration," so to speak.

The Hemingway process has been subjected to a severe examination by H.M. Chief Inspector under the Alkali Acts, who has stated in his Thirty-Eighth Annual Report (p. 31) that the reactions are valid, and in a properly-designed apparatus will successfully, and without loss, stop the escape of the noxious gases. It has also been carefully studied within the last few weeks by Mr. R. J. Friswell, F.I.C., who (as mentioned in last week's issue) is satisfied that the sulphur is completely retained at a minimum of expense, that the plant is simple and not costly, and that the process is self-adjusting to the composition of the gases treated. There is said to be no danger that the scrubbers may become choked with the solid matter deposited in them—firstly, because the sulphur is always soft and light, and is easily washed down by a stream of water; and, secondly, because the only other solid substances produced are sulphides of iron, which are readily and completely converted into thiosulphate when treated with sulphurous anhydride for a short time.

The final products are free sulphur and sulphide of iron, together with a little sulphate of ammonia. The sulphide of iron, as mentioned before, may be burnt to yield the sulphurous anhydride required in the scrubbers. The sulphur is not contaminated with arsenic; and it is therefore ready for the manufacture of non-arsenical sulphuric acid. The plant—as shown in the sketch given last week—consists of the two tower scrubbers, a small saturator, a tank for the scrap-iron reaction, and a pump or means to lift the reagent to the top of the towers. Frequently, this will be all; but if vitriol chambers are not part of the existing apparatus, a sulphur burner is also requisite.

The patentee states that he regards his process as a means of avoiding nuisance and of satisfying the Alkali Inspectors, rather than as a source of profit; but at any rate, if further experience should be as gratifying as the large laboratory tests which have been proceeding for some weeks, the sulphur recovered should go some considerable way towards making the operation pecuniarily self-supporting.

GAS BILLS FOR 1904.

THE following are the principal provisions of the Private Bills relating to gas supply in the United Kingdom which have been deposited in the Private Bill Office. As usual, we classify them in an order beginning with the Bills for the incorporation of new statutory gas companies.

The Aylesbury Gas Bill is to incorporate a limited Company originally formed in 1861, and now having a share capital of £36,000 and a loan of £2000. The limits of the new Company are to be the parish of Aylesbury with Walton, in Buckinghamshire. The capital is to be increased to £100,000 in consolidated 5 per cent. stock, of which £40,000 is to be additional capital. Borrowing powers are to be in the proportion of one-third. The pressure of the gas is to be 8-10ths and one inch. The standard price of 14-candle gas is put at 4s. 6d. per 1000 cubic feet, subject to 10 per cent. discount for prompt payment. Discounts to large consumers are to be as agreed. The prescribed burner for testing the illuminating power of the gas is to be of the type known as Sugg's argand, and it shall be constructed to develop in its use the full illuminating power of gas of the quality prescribed by the Act. Consumers' fittings may be prescribed. Application may be made for an Electric Lighting Order.

The Barnard Castle Gas Bill is for the incorporation of a limited Company, originally formed in 1834 by the name of the Barnard Castle Gaslight Company, for supplying the townships of Barnard Castle and Marwood, in the county of Durham, and Startforth, in Yorkshire. The subscribed capital is £7488, and the Company have expended on the works out of profits applicable to dividend further sums amounting to £3744 and upwards, besides £2000 borrowed money. The capital value of the undertaking is now estimated at £13,232. The limits of supply are to be enlarged, and the name of the Company is to be altered by omitting the word "Light" from the old title. The capital is to be increased to £30,000, whereof £11,232 is to be called the original capital, and the remaining £18,768 additional capital. The dividends are limited to 7 per cent. on the original, and 5 per cent. on the additional capital. The maximum price for 14-candle gas is to be 3s. 6d. per 1000 cubic feet in the parishes of Barnard Castle and Startforth, and 4s. 6d. beyond. Consumers' fittings may be specified. Discounts up to 20 per cent. may be allowed. Permission is sought to apply for an Electric Light Order.

The Bishop's Stortford and District Gas Bill is to incorporate a limited Company formed in 1900 for the purpose of acquiring the undertaking of a former Company under the same name. The limited Company acquired in 1903 the undertaking of the Stansted Mountfitchet Gas Company, Limited, in consideration of the issue to the Liquidator of the last-mentioned Company of perpetual debentures to the amount of £4408, carrying 4 per cent. interest. The capital of the Company now consists of £22,000 in ordinary shares, and £1000 in 4 per cent. preference shares, with a total loan of £7208, inclusive of the debenture issue. The limits of the Act are defined, with reservation of existing rights of supply in the parishes of Much and Little Hadham. The capital of the statutory Company is to be £75,000, by the addition of £52,000; the maximum issue of preference capital being £37,500. Maximum dividends of 7 per cent. per annum ordinary and 5 per cent. preference are to be divided half-yearly; and the Company may, if they think fit, create and issue shares or stock bearing a lower rate of dividend. A reserve fund may be formed out of profits in excess of the authorized rates of dividend, besides an insurance fund and a 10 per cent. renewal fund. The loan capital is to be in the proportion of one-third of the amount of the paid-up stock. The maximum prices of 14-candle gas are put at 4s. 6d. per 1000 cubic feet in or within a mile of the urban district of Bishop Stortford, and 5s. 6d. per 1000 cubic feet beyond. The test burner is to be the "Wandsworth" argand, or such other burner as the Board of Trade may approve on the application of the Company. Consumers' fittings may be specified, with a proviso that nothing shall render the Company liable for any damage which may result from improper arrangement, inferior workmanship, or unsoundness or insufficiency of material, whether such pipes and fittings have or have not been inspected on behalf of the Company. Discounts to consumers are not to exceed 20 per cent. Tenants are to be liable for sub-tenants' supplies. Consumers are to give 48 hours' written notice of quitting. The Directors are to fix the remuneration of the Secretary.

The Brixham Gas Bill is to incorporate a Company originally formed in 1838. The Company have expended on capital account £7000, and have not borrowed any money. The capital of the statutory Company is to be £20,000, whereof £13,000 is to be additional capital with not more than £10,000 preference. Unsold stock issues are to be offered to existing proprietors, employees, or consumers. A 10 per cent. renewal fund is proposed. The reserve fund is only to be formed of divisible profits under the sliding scale. The standard price for 14-candle gas is put at 4s. 6d. per 1000 cubic feet. The prescribed test-burner is to be the "London" argand, or such other burner as shall for the time being be approved by the Board of Trade on the application of the Company. Consumers' fittings may be specified.

The Chippenham Gas Bill is to incorporate a Company dating from 1834, who erected their works upon a leasehold site, and expended considerable sums on capital account out of revenue, but have no mortgage debt. The limits of the statutory Company are to be enlarged, and the capital increased to £41,000; being the aggregate of the £10.000 original stock of the old Company, £6000 in the form of 5 per cent. improvement stock, and £25,000 additional 7 per cent. capital. Not more than £12,000 is to be raised as preference capital. The borrowing powers are to be in the proportion of one-third of all the issues of stock. Lands are to be acquired compulsorily, with powers of severance. The standard prices of 14-candle gas are put at 4s. 2d. per 1000 cubic feet within the borough of Chippenham as now constituted, and 4s. 8d. per 1000 cubic feet beyond. Ten per cent. consumers' discounts are proposed. The "London" argand is to be the prescribed burner, with the gas consumed at the 16-candle flame rate. Consumers' fittings may be specified. Permission is desired for application for an Electric Lighting Order.

The Corbridge Gas Bill is to incorporate a Company formed in 1863 for the purpose of lighting with gas the town so named, in Northumberland. The share capital of the Company amounts to £3500, and £700 has been borrowed in the form of debenture stock. Upwards of £2500 has been spent out of revenue on capital account. The limits of the statutory Company are enlarged, and the capital increased to £16,500, which is to include the original capital stock of £7000, improvement stock to the amount of £2500, and additional capital of £7000, all bearing 5 per cent. dividend. The borrowing powers are in the proportion of one-third of the share capital. The standard prices of 14-candle gas are to be 4s. 2d. and 5s. per 1000 cubic feet, for the interior and outlying districts respectively. Consumers' discounts are to be allowed up to 15 per cent. for prompt payment, and to large consumers as may be agreed upon. The prescribed testing burner is to be Sugg's "London" argand for 14-candle gas, or any other burner and chimney approved for this purpose by the Board of Trade. Consumers fittings may be specified. Power is to be taken to apply for an Electric Lighting Order.

The Felixstowe Gas Bill is to incorporate a Company formed in 1883, with a Provisional Order obtained in 1895. The Company are to be reorganized by the name of the Felixstowe Gaslight Company, with a capital of £49,970, whereof £7970 is to be preference and £9000 ordinary stock, divided among the existing shareholders. Borrowing powers are to be in the proportion of

one-third of the whole stock issue. A renewal fund is to be formed as part of the expenditure on revenue account. Discounts of unnamed amount are to be allowable at different rates, according as the gas is consumed for lighting or for power or heating purposes. Gas of 14-candle power is to be supplied, tested at the works with two hours' notice to the Company. The prescribed burner is a "London" argand No. 1, or any other burner or chimney approved for this purpose by the Board of Trade on the application of the Company. The standard price for gas in the urban district of Felixstowe and Walton is put at 4s. 8d. per 1000 cubic feet, with an excess of not more than 1s. for the outlying area. Consumers' fittings may be specified. It is proposed to supply gas for other than lighting purposes as may be agreed upon. After 1905, demands not exceeding £100 may be recovered in the County Court.

The Hampton-in-Arden Gas Bill is to incorporate a new Company for the supply of the places named, in Warwickshire, with a share capital of £15,000, with one-third loan. Gas lands are to be compulsorily acquired. In the case of prepayment meter supplies, the Company are not to be deemed to have received the money paid until the collector has taken possession thereof. The maximum price of 14-candle gas is put at 5s. 6d. per 1000 cubic feet, tested by the "London" argand No. 1, or any other burner or chimney approved by the Board of Trade. Power is sought to apply for an Electric Lighting Order.

The Harlow and Sawbridgeworth Gas Bill is to incorporate a Company formed in 1862, with works at Harlow, in Essex. The area of supply is defined; and the name is to be altered. The capital is to be increased from £21,000 to £33,000, all 5 per cent., with £7500 by way of loan. The standard prices for not less than 13-candle gas are put at 4s. 2d. per 1000 cubic feet for gas supplied within two miles of the existing works, and 4s. 8d. per 1000 cubic feet beyond. The prescribed burner is to be Sugg's argand for testing gas of the illuminating power of 13 candles, or any other burner or chimney approved for the purpose by the Board of Trade.

The Matlock and District Gas Bill is to incorporate a Company formed in 1887, with a Provisional Order of 1891. The limits of the Act are defined; and the Order is to be repealed. The obligations of the old Company under certain indentures to supply gas are to be cancelled. The capital of the statutory Company is to be £92,000, whereof £45,547 is additional capital to be raised under the Act, with a 5 per cent. standard dividend. New issues are to be first offered to gas consumers and employees of the Company at the average market price for the previous six months, as recorded in the Company's books. A renewal fund may be established. The loan capital is to be in the proportion of one-third. No person is to be disqualified for a directorship by reason of his being an officer or servant of the Company, or by being interested in a contract with the Company. Lands are to be compulsorily acquired. A tramroad is to be constructed to connect the gas-works with the Midland Railway. The standard price chargeable for coal-gas supplied for illuminating purposes is put at 4s. 3d. per 1000 cubic feet, with 6d. excess for the parishes of Rowsley and Winster. Lighting gas is to be of 14-candle power; but power-gas need not be of any illuminating quality. It will not be lawful for the Company to supply power gas which contains more than 14 per cent. of carbon monoxide, or does not possess a distinctive and readily perceptible smell. The penalty for contravening these provisions is £50. The duty of enforcing the Act in this regard is placed upon the Inspectors of Factories and Mines. The prescribed burner is to be Sugg's "London" 16-candle argand No. 1, with the gas consumed at such a rate as to yield the maximum light for which the burner shall have been designed; and the gas must be burnt for at least half-an-hour before the commencement of the test. In the event of the gas examiner finding any defects of illuminating power, he is to forthwith give notice of the same to the Company at their office. Discounts are to be allowable under particular conditions. Prepayment meter supplies are to be chargeable with an excess of 10d. per 1000 feet for hire of meter and fittings; and the money put into such meters is not to be deemed to have been paid to the Company until they have received it.

The Wellington (Somerset) Gas Bill is to incorporate a Company originally formed in 1834. The capital of the statutory Company is to be increased to £32,500, whereof £14,000 is to be original 10 per cent. stock, £3500 is to be 5 per cent. improvement stock, and the remainder additional 7 per cent. capital, with one-third borrowing powers. The standard price of 14-candle gas is to be 4s. 3d. per 1000 cubic feet. Discounts may be allowed at the rates of 10 per cent. for prompt payment and 20 per cent for large consumption. The burner for testing the gas is to be a "London" argand No. 1, with the gas burnt at the 16-candle flame rate. Consumers' fittings may be specified. Application may be made for an Electric Lighting Order.

The Withnell Gas Bill is to incorporate a new Company for the supply of gas to the urban district named, in Lancashire, with a share capital of £15,000, and power to borrow £5000. Lands are to be compulsorily acquired. The maximum price of 14-candle gas is put at 5s. 6d. per 1000 cubic feet, tested by the "London" argand No. 1 burner, or any other burner or chimney approved for this purpose by the Board of Trade. Discounts up to 20 per cent. for all purposes are to be allowable. Application may be made for an Electric Lighting Order.

The York Town and Blackwater Gas Bill is to incorporate a Company formed in 1859 for the supply of York Town, in Surrey, and Blackwater, in Hampshire, with an Order granted in 1890 and another in 1899. The limits of supply are defined; the powers of the Ascot District Gas Company to supply gas within the limits being repealed. Additional capital amounting to £38,200 is required. Equal bids for new issues by employees or consumers may be preferred. The borrowing powers of the Company are increased to one-third. A renewal fund may be formed. A railway is proposed to connect the gas-works with the Reading branch of the South-Eastern Railway Company, to be completed within five years. The standard price of 15-candle gas is put at 4s. 9d. per 1000 cubic feet, with 15 per cent. discounts. The test burner is the "London" argand No. 1, or such other burner as shall for the time being be approved by the Board of Trade. Consumers' fittings may be specified. Application may be made for an Electric Lighting Order.

THE REFEREES' "NOTIFICATION" FOR 1904.

We have received from the Metropolitan Gas Referees their "Notification" for the current year, which differs in several respects from that issued for the twelve months just closed. The number of testing-stations remains as before—fifteen for the Gaslight and Coke Company, two for the Commercial Company, and six for the South Metropolitan Company; and no change has been made in the methods of testing. At the close of the "Notification," however, an important addition has been made to the paragraph relating to the sulphur compounds other than sulphuretted hydrogen. Under the old regulations, the maximum amount of sulphur allowed in the gas in the summer six months (April 1 to Sept. 30) was 17 grains per 100 cubic feet, and 22 grains during the other months. These amounts still stand, "unless the average quantity at any testing-place for the thirteen weeks immediately preceding any testing shall have been less than 12 grains per 100 cubic feet of gas," in which case "the maximum at any time of year at that testing-place shall be 27 grains per 100 cubic feet of gas." In the appendices—the first three of which are devoted to the 10-candle pentane lamp and the table photometer—some portions of Appendix D, which contains a full-sized section, with dimensions, of Sugg's "London" argand burner No. 1, have been omitted. It is now specified simply that for testing the 16-candle gas of the Gaslight and Coke Company the chimney is to be 6 inches long and $1\frac{3}{4}$ inches in internal diameter; while for the 14-candle gas of the Commercial and South Metropolitan Companies it is to be of the same length and only $1\frac{5}{8}$ inches in internal diameter. But in the event of the gas-flame at any time mounting above the top of the chimney, one having a diameter of $1\frac{3}{4}$ inches is to be substituted. It may be remembered that last year the Referees introduced a new table to be used in testing-places supplied with gas by the Commercial Gas Company. This has now been omitted, and the necessary textual correction made in the paragraph of the "Notification" relating to the times and mode of testing for illuminating power.

Preservation of Wrought Iron by Hydraulic Cement.—The excellent preservation of wrought iron by hydraulic cement is strikingly illustrated by samples recently cut from a water-pipe that had been 44 years in constant service in New Brunswick. It appears, from particulars given in the "Engineering Record," that the distribution system for the city water supply of West St. John was laid in 1859 with rivetted pipes from 4 to 12 inches in diameter, which were covered inside and outside with coatings of pure cement about 1 inch thick. The metal was a good quality of soft wrought iron, rolled to No. 22 gauge; and many of the pipes are still in service under a pressure of 60 lbs. per square inch. Samples recently cut out were found to be in surprisingly good condition, and one piece was split down the side and flattened so as to be easily packed. Despite the severity of the treatment received, a large proportion of the surface of the iron is still covered with the cement mortar, which adheres firmly, and wherever the metal is exposed, it is bright, and entirely free from rust.

Reinforcing Sound by Flame.—At a recent meeting of the Physical Society, the Rev. T. C. Porter described a method of mechanically reinforcing sounds. He pointed out that if a tuning-fork be sounded and placed in a flame, there is a very marked strengthening of the sound. This is proved not to be due to resonance in the ordinary sense, but to the change from continuous to intermittent combustion. In certain circumstances, the impulses given to the air external to the flame by the waves of burning gas are more forcible than those given by the unaided sounding body Thus a new way of reinforcing the sounds given by a vibrating body is found. This was demonstrated for the phonograph—a flame being used instead of the ordinary trumpet. Coal gas and air are brought by tubes into the chamber of the reproducer, and thence to a jet, where they are burnt. The vibrations of the reproducer are thus impressed on the issuing gas and air, which burn synchronously with them; the sounds thus emitted being easily heard over a large room. In practice, it is found best to spread out the flame by a second jet of air, or of mixed air and gas, placed close to the first jet and at right angles to it.

A NEW SOURCE OF ECONOMY FOR GAS-WORKS.

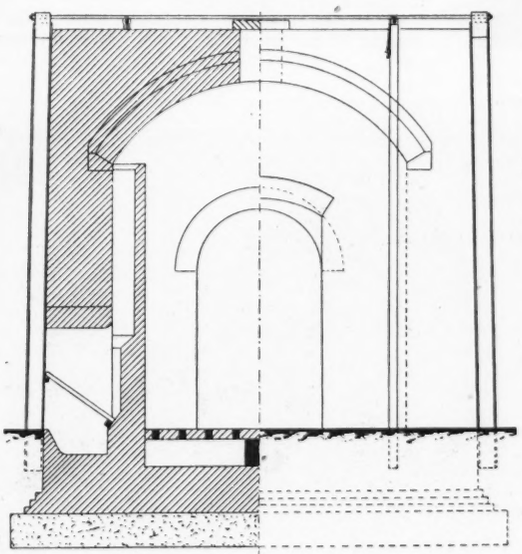
Fire-Brick Making at the Crystal Palace District Gas Company's Works.

In the search for new veins of economy in gas-works which it would pay to open up, there is one which in this country has, we believe, been passed over, except in a single instance, until just recently. And it was on a visit a short time since to the Crystal Palace District Gas Company's works that the exception was found; and the consent of Mr. S. Y. Shoubridge was there and then obtained to the publishing of a short illustrated account of what he has done, and is doing, in the working of this particular new vein.

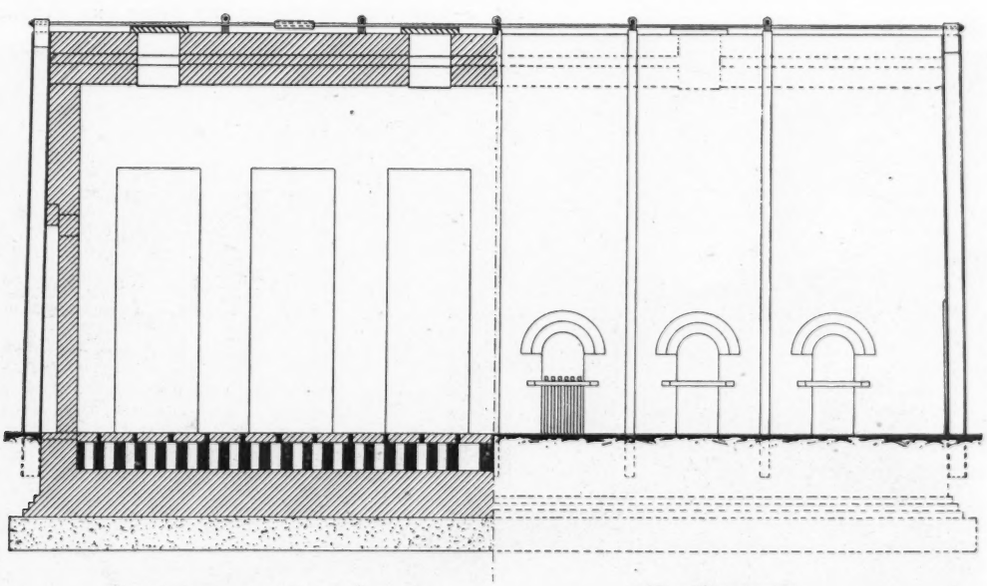
Let us pause for a moment to indicate it. In all gas-works, there is a constant deterioration of the retort-settings going on; and the time inevitably comes when parts of the settings have to be renewed, and, ultimately, when they have to be completely replaced. What becomes of all the old retorts, bricks, blocks, and tiles? Their output in prosperous works is a constantly increasing quantity; but their release from service is in most cases regarded as the end of their valuable career—with the result that, when the heap accumulates, no better future is found for the material than its utilization for road making or its burial in the foundations of new buildings. That, says Mr. Shoubridge, is a ruthless waste of valuable fire-resisting material; and how he has effected an economy for the Crystal Palace Gas Company by its profitable utilization is what was seen lately at Sydenham, and what is to be here described.

How at Sydenham this hitherto wasted material is made to serve a higher useful purpose than hitherto is suggested by the sub-title of this article. It is now quite five years since the Crystal Palace Gas Company first made, by their own men on the works, all the ordinary bricks required for repairs and extensions of buildings; and in this way they have worked a fourfold good. In the first place, they have been able to utilize a considerable quantity of surplus clay that there is on the works; secondly, they have made room in this way for future extensions of the plant; thirdly, they have provided summer employment for some of their stokers who would otherwise have been discharged; and, fourthly, they have secured the bricks they require at a far cheaper rate than they would have had to pay for them outside with delivery on to the works. It will be of interest perhaps to give a few lines of description concerning the ordinary brick-making plant, as it was really this which led up to the development now specially under notice. The plant occupies a considerable space in the works, and consists of a wash-mill, a set of three-throw slurry pumps and two pug-mills, driven by a six-horse power Crossley engine. In addition, there are four "backs," measuring 86 ft. by 48 ft. by 6 ft. 6 in. each, in which the clay is stored and prepared in winter ready for the brick-making season, which commences as soon as the frost is over in the spring. Then there is the "hack" or drying-ground, of an area of 200 ft. by 250 ft., where the bricks are stacked under covers to dry as soon as made, and where they remain until they are hard enough to go into the "clamps" or kilns, which are built on a strip of ground at the end of the hack ground. This plant is capable of making no less than 2 million bricks a year.

It is not an unnatural result of the success of this manufacture of ordinary bricks that the Company should be induced to consider the possibility of making as well fire-bricks, blocks, and tiles. The step from the one to the other is not great. It therefore came about that, something like eighteen months ago, a portion of the oldest retort-house, which had not been in use for some years, was utilized for the purpose. The retorts were taken out of the settings, the hydraulic mains and other ironwork were removed, and two of the retort-arches were converted into kilns by making a number of openings through the division-walls to serve as furnaces, and by making new floors having openings communicating with the flues beneath, through which the spent heat was conveyed to the chimney. An idea of the work done to the arches will be gained by an examination of the photographs—figs. 1 and 2. The floor of the retort-house on either side of the bench was excavated to a depth of about 2 feet, and a series of flues, connected with breeze furnaces at one end and with the chimney



Cross Section. End Elevation.



Longitudinal Section. Side Elevation.

The New Fire-Brick Kiln at the Crystal Palace District Gas Company's Works.—See Photo. No. 5.

FIG. 1—VIEW OF THE OLD RETORT-BENCH, SHOWING TWO ARCHES CONVERTED INTO KILNS; ALSO A PORTION OF THE DRYING-FLOOR.

at the other, were built. The flues were covered with tiles, and made excellent floors (fig. 3) for drying the newly-made bricks upon before they were put into the kilns. The only other things needed were a powerful grinding-mill (fig. 4), in which the old fire-brick rubbish from dismantled retort-settings is ground up before being incorporated with the new fire-clay, an engine to drive it, and the necessary moulds and moulding-benches. The engine, which is of 30-horse power, was supplied by Messrs. William Grice and Sons, of Birmingham; and the grinding-mill, which is of the top-driven type, was made by Messrs. Scholefield, of Leeds.

The old kilns were each capable of containing 12,000 9 in. by 4½ in. by 3 in. bricks, or their equivalent in tiles or blocks, and took nine days in working off—viz., three days drying, three days hard firing, and three days cooling. These kilns, however, were too small for economical working; the fuel used being sufficient to burn a much larger number of bricks. Therefore, after twelve months' running of the old kilns, a new and improved one, to hold 36,000 bricks, was specially built; and this is large enough to permit of—mark this!—retorts, as well as bricks, being burnt in it. This extensive kiln is shown in the rear of the photograph fig. 5; and an interior view of an adjoining partly constructed kiln of equal dimensions is also given (fig. 6). The old kilns and retort-bench, which, though they did excellent trial service, were of a somewhat makeshift character, have been pulled down, ground up, and converted into new bricks; and the space occupied is now being turned into a large drying-floor. It is seen from this that nothing in the way of old fire-brick is wasted.

It was not within us to try to draw Mr. Shoubridge on the score of costs in connection with such work as this. But the improvement and enlargement of the plant tells its own tale of success from the financial standpoint, and, if further evidence were wanted, it would be found in the statement that probably next season the bricks which have hitherto been made by hand, will be produced by machinery driven from the present engine. This will considerably reduce the cost of making; and the plant will then be a very complete one.

As to the preparation of the material for the making of the fire-brick goods. New fire-clay is

FIG. 2—END VIEW OF ONE OF THE KILNS AND FURNACES.

FIG. 5—KILN IN COURSE OF CONSTRUCTION IN FOREGROUND; COMPLETED NEW KILN IN REAR.

obtained in the rough state from collieries in the Midlands, and, after being ground, is mixed with the old fire-clay material previously ground up, in the proportions of 30 per cent. of new clay to 70 per cent. of old material. This mixture is found to make excellent bricks, capable of standing great heat, and Mr. Shoubridge informs us, equal in every way to those formerly purchased from Stourbridge. The Company have tried their hand at making retorts, and have produced a few lengths very successfully. They have, however, confined themselves principally to making the bricks, blocks, and tiles (fig. 7), of which they use large numbers every year. It is found that a considerable saving is effected in this way; and it is obvious that it must be so, when it is remembered that 70 per cent. of the new brick material is composed of the old retorts and bricks that formerly were used for road-making, and sometimes even cost money to dispose of. The waste of all this valuable fire-resisting material is now stopped—at Sydenham; and the monetary advantages realized by the Company include the saving of the cost of carriage and makers' profits on 70 per cent. of the fire-brick material used, excepting the retorts, and, moreover,

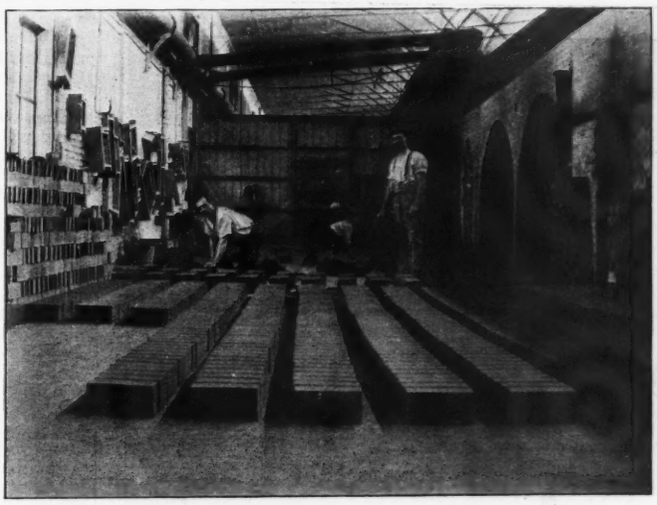


FIG. 3—VIEW OF A PORTION OF THE DRYING-FLOOR.

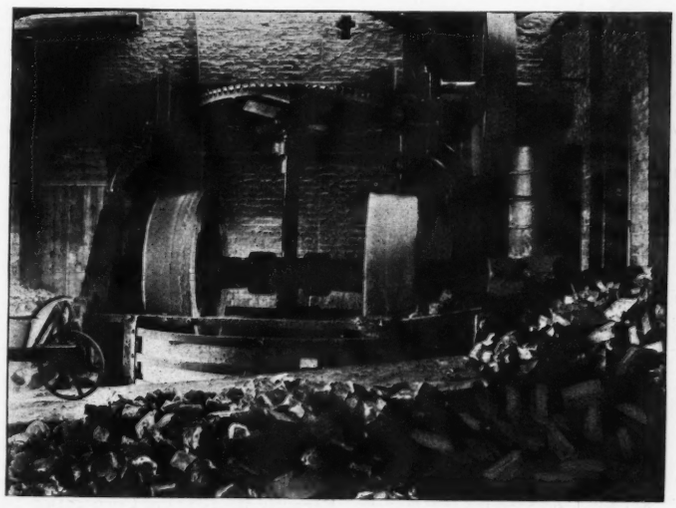


FIG. 4—VIEW OF THE MILL USED FOR CRUSHING OLD FIRE-BRICK MATERIAL AND GRINDING FIRE-CLAY.

the wages for fire-brick making go to the Company's own men. That is an especial point of gratification to the Engineer.

The Crystal Palace District Gas Company are, we believe, the first Gas Company in this country to make their own fire-brick goods; but it is understood that other companies are now profiting by their example, and will soon have fire-brick plants in operation. As will have been gathered from the description, the plant required is of an ordinary character; and in its operation and attendance, it does not require any exceptional ability. It was of interest to learn with what ease the men had turned to the work, and to see with what skill they are now performing it. The quality and general finish of the fire-bricks and the numerous forms of blocks which they produce are, judging from the samples seen, of the highest, and that good character, we are told, is fully upheld in the use of the goods.

When the enormous bulk of fire-brick material that is discarded in large and medium-sized gas-works in the course of the year is remembered, it is surprising that it has not been before this turned to profitable account in the manner sketched here. In that bulk of material is a source of economy

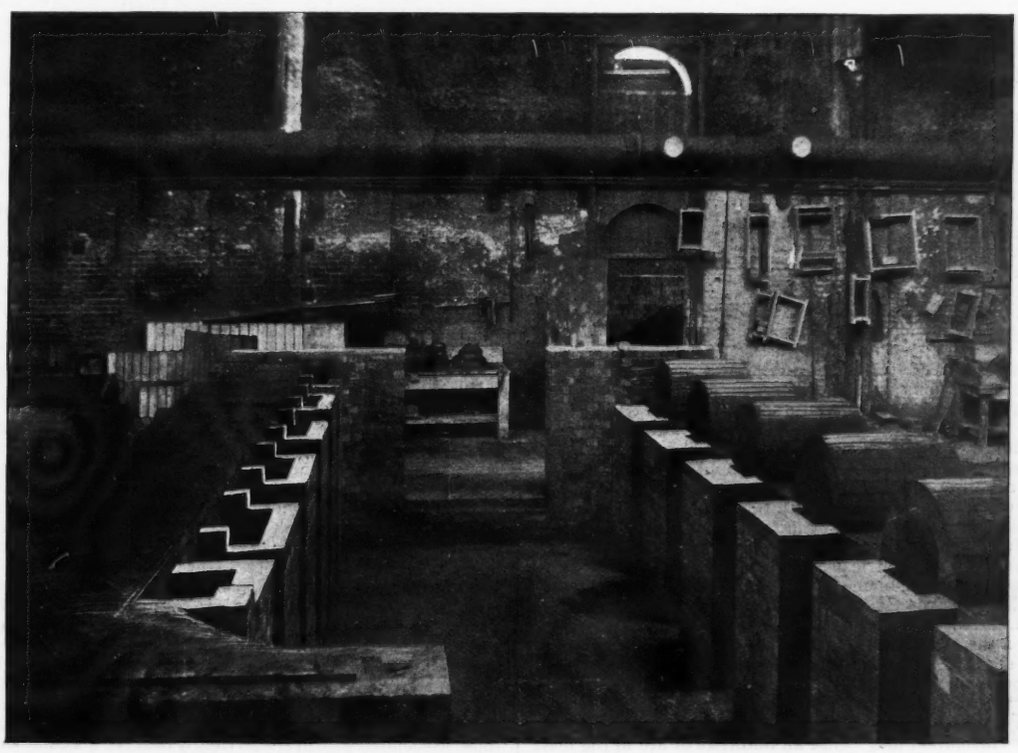


FIG. 6—INTERIOR VIEW OF THE KILN IN COURSE OF CONSTRUCTION.

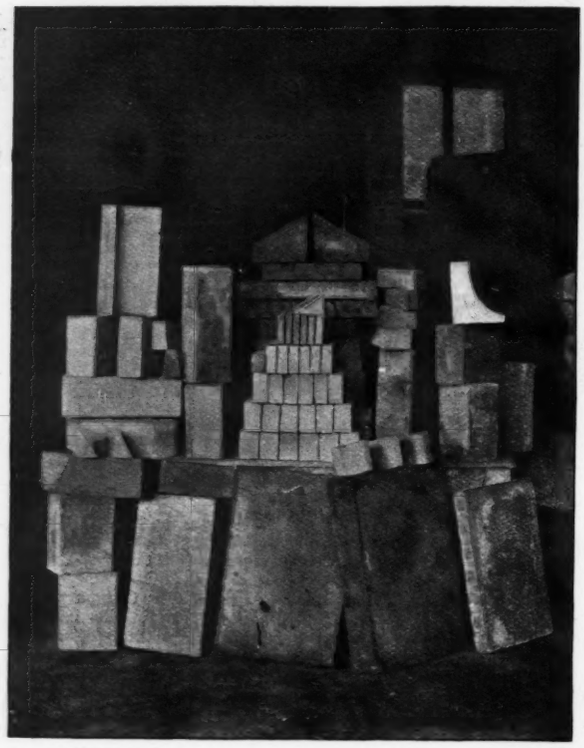


FIG. 7—SPECIMENS OF THE FIRE BRICKS AND BLOCKS MADE BY THE CRYSTAL PALACE GAS COMPANY'S PLANT.

which, added to the other considerations advanced in this article, as drawn from the experience at Sydenham, merits the attention of gas engineers and managers generally.

ELECTRIC LIGHTING MEMORANDA.

Electricity and the Lighting of Theatres—Terrible Theatre Fire at Chicago—Comparison of Gas and Electricity Fires—A Trading Blunder at Glasgow.

THE electric lighting industry starts the New Year unfortunately under the shadow of at least one terrible fire, and one central station breakdown. The Chicago theatre fire, which at the moment of writing appears to be chargeable with upwards of 600 deaths, will be chronicled as one of the most awful events of the kind in the history of civilized nations. It has always been recognized in the "JOURNAL" that the advance of material civilization, which is mainly along the lines of increasing the comfort and saving the pains of the individual, has the attendant drawback of increasing also the danger and discomfort of failures. The simpler the life, and the less equipped with all the advantages of modern urban communities, the fewer the risks and inconveniences undergone through things going wrong. Contrariwise, the more complicated the equipment of the citizen, the more he must suffer from the breakdowns of services of which his ancestors knew nothing, and consequently never missed. Electric lighting and traction, we will say, are among the luxuries of existence in all modern centres of civilization, which classification, one must suppose, includes Chicago. It has always been the fond delusion of the providers of these services, that among their recommendations is a superior degree of safety in use. Independent judgment, based on the principle above enunciated, has never really accepted this claim. Apart altogether from such knowledge of the working of an electric lighting or power service as experts must possess, the philosophic observer refuses to consider half-tamed lightning as exempt from the common rule which connects convenience with risk. The Board of Trade have consistently regulated the traffic in strong electric currents in the United Kingdom on this unexpressed principle.

It is possible that electric lighting may be exonerated from the heaviest part of the blame that seems to attach to it at present for originating the Chicago theatre fire; but even so, this is not very material. The serious point is, that electric lighting does not render a theatre safer than a similar place of entertainment lighted by other means; while it has certain risks peculiar to itself. One never knows where the danger is. As Mr. Arthur Shean, writing to "The Times" on this subject, remarks, "under the old gas system a naked light made danger apparent, but with electricity defective insulation may cause an outbreak of fire in the least suspected place," and frequently in an inaccessible spot. For a gas-burner, or leak of gas, to start a fire, a combination of material things is necessary—the gas, a light, and contact with something inflammable. Failing one of these, nothing happens. Even should the gas-service cause a fire, the light throughout the house will go on burning, thus showing the way to safety. On the other hand, an overheated electric wire, or a short-circuit, begins by generating inflammable vapour which it forthwith ignites. The mechanism for provoking an electric conflagration is thus self-contained. And the first thing that happens in connection with an electric light fire is the extinction of the lights. One must therefore always remember that the circumstance of a place being lighted by electricity certainly does not render it any safer from fire. It is to be feared that a delusion of the latter kind has prevailed in some quarters. If so, the latest Chicago fire should permanently dispel it. The other unfortunate occurrence to which we have alluded is the switchboard fire, and consequent breakdown, at the Bristol generating station, reported last week. As the whole fitting was destroyed, no trace of the origin of the outbreak remained to tell the tale; but the accident caused considerable inconvenience in the city.

There was at one time a public man known to the Athenians as "the Just;" and tradition has it that this volatile community grew in time so tired of hearing the gentleman so described, whenever his name was mentioned, that they banished him. This action of the ancient Athenians was doubtless discreditable to them as a community; but it nevertheless established their humanism. Others have suffered in like manner from the repute of the "unco' guid." This is probably the reason why the misfortunes of the Corporation of Glasgow in the matter of their telephone system are a source of such gratification to outside observers. Glasgow, notoriously, has been applauded to the skies for the exceptional success of its Corporation undertakings. Indeed, Glasgow is recognized as the fount and origin of successful municipal trading; so that whenever any irreverent person ventured to doubt the efficiency of Bumble as a shopkeeper, the great example of Glasgow was hurled at him, usually to his discomfiture. There did not appear to be anything that the Corporation of Glasgow could not do in the way of trading; and a bulky volume was once required to set forth the triumphs of the Corporation in this respect. But, apparently, even Glasgow is fallible; and the biggest of all trading municipalities has now tripped up over a telephone system. It is very remarkable. An exchange telephone system is one of those enterprises to which the law of diminishing returns applies. That is to say, every extension of custom beyond a certain economic maximum, costs more than it is worth. The Corporation of Glasgow seem to have gone into the telephone business altogether too light-heartedly. In the event, they have run into grave financial troubles; and they have the additional mortification of perceiving that those who witness their misfortunes are rather pleased than grieved at the spectacle. Yet, really, it is not an unnatural attitude on the part of non-municipal traders, who have in the past suffered enough on account of Glasgow. Recently, the Glasgow Corporation telephone system has been severely criticized in "Engineering," which shows that the undertaking has cost nearly double the original estimate. Upon the basis of charge adopted for the use of the system, it is asserted that the service must prove a positive and increasing burden upon the rates, which in the case of the Glasgow Corporation undertaking is a very serious reflection on the business capacity of the Committee responsible for the inception and conduct of the concern.

Willey and Co.—As was stated in the "JOURNAL" for the 22nd ult. would be the case, the registration of Messrs. Willey and Co., of London and Exeter, as a private limited Company has taken place (as from Jan. 1). The reasons are said to be of a purely family and domestic character; Mr. Henry A. Willey still continuing his connection with the Company as Managing-Director and Chairman, and holding the major portion of the shares. We learn from him that the new status of the business will enable him to allot shares to his men, and thus admit them in a measure into the proprietary. This is the outcome of the profit-sharing scheme which, at the instance of Sir George Livesey, Mr. Willey has been trying with some success during recent years. The new Company will considerably broaden the operations of the concern—prosecuting vigorously the new system of inclined retorts known as the "Didier," an installation of which (the first) has been recently inaugurated at Plymouth. The results are reported to be admirable. In association with the British Westinghouse Company, the firm will also introduce electric lighting by means of gas-engines, and hope that this method, where electricity is insisted upon, will reduce the loss of consumption gas companies would otherwise sustain. The new firm will have some valuable patents conveyed to them, including the "Simpson" penny-in-the-slot invention. The American commission sent by Mr. Willey to the States have reported upon many valuable labour-saving appliances used in the manufacture of gas cooking-stoves, gas and electric fittings, and in gasholder and engineering constructional work. Mr. Willey has adopted a wise policy in the selection of his colleagues on the Board from the Managers of the various departments, and, as far as possible, improving the positions of all those associated with him who rightly deserve his confidence. The only outside Director is Mr. Frederick Templer Depree, J.P.

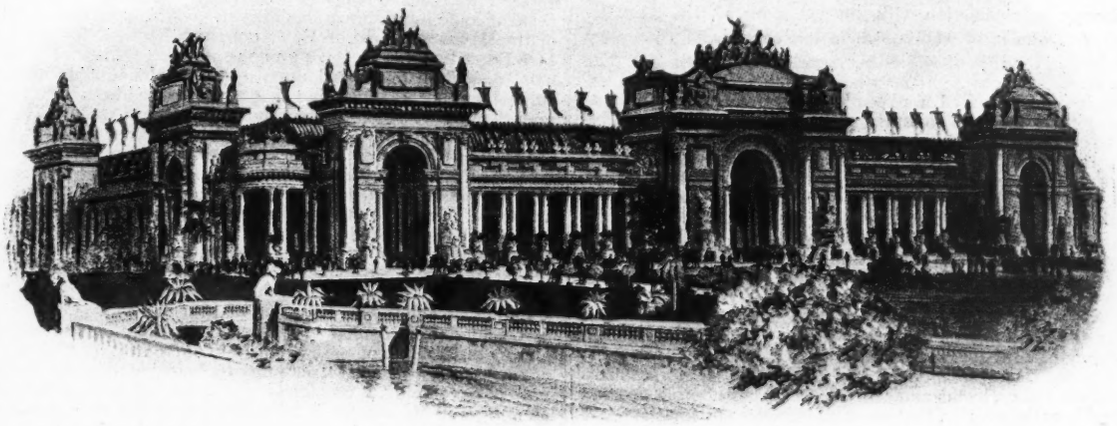
GAS EXHIBITS AT THE ST. LOUIS "WORLD'S FAIR" OF 1904.

The Arrangements Suggested by the Western Gas Association.

In previous issues of the "JOURNAL," reference has been made to the steps which are being taken by the President of the Western Gas Association (Mr. F. H. Shelton) and his associate officers to ensure that the gas industry shall be thoroughly well represented at the World's Fair to be open in St. Louis from the 1st of May till the 1st of September next. Being in the district, it had occurred to the Association that they should participate in this great undertaking, and the matter was discussed at the meeting held at Indianapolis in the spring; the result being that it was left in the hands of the President, with power to act. This power he exercised by the issue of a long circular which appeared in our American contemporaries early in October setting forth his views and reporting progress so far. He had not only himself given the subject much thought, but had sought the opinion and counsel of many representative members of the Association; and the following views were pretty generally expressed: That the gas industry should certainly be represented, if reasonably possible; that the Association could and should, most appropriately, arrange for some kind of an exhibit, and that they could also most appropriately act as hosts to visiting gas men by providing suitable headquarters, but that, being primarily a body of gas engineers and managers, they should not undertake to make what is commonly known as a "trade exhibit," leaving that to the supply and trade interests proper, as they might see fit; that they should confine themselves to an exhibit showing (1) the process and methods of gas manufacture and distribution; (2) the history of illuminating gas development in the United States; and (3) the utilization of gas in its many appliances and channels.

These views were in entire accord with those held by Mr. Shelton; and he therefore went forward on the lines indicated. Arrangements were entered into for securing suitable space in the centre of one of the principal buildings—the Palace of Liberal Arts, 525 feet wide, 750 feet long, and costing about £100,000—and they were successful. The building which will be the home of the gas exhibit is shown in the accompanying illustration, reproduced from the issue of the "American Gaslight Journal" last received. The next step was to bring the project under the notice of the members of the American Gaslight Association, at their annual meeting at Detroit, and to enlist their co-operation in securing for it a successful issue. Mr. Shelton explained that his Association anticipated having the finest collection of gas-consuming apparatus ever brought together in America; and that while the most modern appliances would have the first consideration, the historical side of the subject would by no means be neglected. The Association did not seek to limit the exhibit in any way; and they would welcome the help of any individual or Association in the production of one which should be worthy of the industry.

What this exhibit is intended to be, and what it is not to be, are concisely set forth in further circulars issued by Mr. Shelton. In the first place, it will be of a technical and historical character,



THE PALACE OF THE LIBERAL ARTS AT THE ST. LOUIS EXHIBITION, WHERE THE GAS EXHIBITS WILL BE HOUSED.

and consist of representative samples or models of machinery and apparatus to be lent by gas men and manufacturers to the Association, who will be the exhibitors. It will not be a trade exhibit of complete lines of individual manufactures, as lack of space and other reasons preclude this. It will comprise three classes: (1) Models and samples of gas machinery, &c., to show the present methods and state of the art of illuminating gas manufacture and distribution. (2) Models or samples of the same, showing historical and interesting early forms leading up to present practice. (3) Gas-consuming appliances, especially industrial forms (in contrast to house appliances), in greater variety and number than ever before brought together. These classes will be divided into 35 groups. Though the exhibit will be arranged for by, and under the auspices of, the Association, it is not limited to that body. Participation by all United States and Canadian gas men and manufacturers of gas machinery or appliances is invited and will be welcome.

The 35 groups will be divided into four classes: (I.) Manufacture. (II.) Distribution. (III.) Utilization. (IV.) General. Class I. will include the following groups: (1) Raw materials. (2) Water-gas apparatus. (3) Coal-gas apparatus. (4) Miscellaneous processes. (5) Scrubbers and washers. (6) Condensers and tar-extractors. (7) Exhausters. (8) Purifiers. (9) Station meters. (10) Holders. (11) Governors. (12) Labour-saving machinery. (13) Bye-products. (14) Laboratory apparatus. (15) Photometrical apparatus. (16) Carburetting apparatus. Class II. will consist of the next five groups: (17) Mains. (18) High-pressure distribution. (19) Services and house regulators. (20) House Meters. (21) Tools. Class III. consists of the next eleven groups, which are subdivided under the headings of "Light," "Heat," and "Power." In the first subdivision are: (22) Flat-flame and plain burners. (23) Old high-candle power burners. (24) Incandescent burners (single). (25) Arc lamps, or cluster burners. (26) Gas-fixtures. In the second, under "Domestic Heating" we have (Groups 27 to 30) ranges, heaters and radiators, water-heaters, and miscellaneous household appliances. Group 31 consists entirely of industrial gas appliances; and Group 32 of gas-engines. Class IV. (Groups 33 to 35) is devoted to books and educational matters, charts and statistical documents, &c., and curios.

As already mentioned, the necessary space has been secured, and the effective utilization of it will be entirely in the hands of the Association, who will provide the showcases, stands, tables, railings, furniture, power, and any necessary motors to operate working models, gas, piping, signs, labels, stationery, attendant, janitor's service, cleaning, storage of crates and packages, unpacking and repacking, printing, &c., supervision, and insurance. All they ask gas men or suppliers to do is to lend, in every instance possible, something suitable for exhibit, advise Mr. Shelton that he or they can and will do so, have the exhibit boxed and ready to ship by the 1st of April, and subscribe what he or they can towards the cash necessary to put the matter through. Every contributor of an article for exhibition will have due credit given to him by a suitable card or label affixed. A novel feature of the show will be a lighthouse, which will be erected by the Association, as their individual exhibit, in the centre of the Liberal Arts Palace. It will be an iron model, 35 feet high, of the South-West Pass Lighthouse, which will be constantly illuminated by high-candle power gas-burners. It is intended that this lighthouse—a beacon of light ever burning—shall fittingly symbolize the aims and the purposes of the Association, apart from the sentimental and geographical interest attaching to the lighthouse (the original of which is 125 feet high) as the landmark at the entrance of the Valley of the Mississippi, the territory of the Louisiana Purchase.

All this is very interesting, and will doubtless prove of great

value to the gas industry. But who is going to pay for it? Mr. Shelton shall himself answer the question in the words of his last circular: "Gas companies, gas men, and supply men, public spirited and loyal enough to the industry, to subscribe, though but a moderate sum each, enough to form a total expected and desired fund of $10,000, with which money the first worthy exhibit of the gas industry in any such Exposition in America may be accomplished." We are pleased to find that a good start in subscriptions has already been made. Any unexpended balance of the money collected will be returned *pro ratâ* to subscribers. He states that in the last matter of this sort in which he had any participation, 17·56 per cent. was returned as not needed. The Association propose to issue bronze medals to pleasurably commemorate the Exhibition—one to be given to each exhibitor, and to each contributor to the subscription fund, and to them only. In addition, it proposes to issue, as special marks of distinction, first, second, and third prizes, consisting of 15 silver medals, to be awarded: (*a*) For the best or most complete exhibit by a gas company; (*b*) for the best or most complete exhibit by a manufacturer; (*c*) for the best model exhibited; (*d*) for the most novel exhibit, or that evidencing the newest worthy invention; (*e*) for the best and oldest authentic historical exhibit. Suitable Committees for judging the exhibits and for awarding the medals will be appointed. The foregoing is entirely a matter of the Association's own procedure, and altogether apart from any award that may be made by the Exhibition authorities. The carrying out of the whole scheme, on behalf of the Association, is in the hands of Mr. Shelton, whose postal address is No. 1004, Penna Building, Philadelphia.

THE PRESIDENT OF THE STEVENS INSTITUTE.

THE issue of the "JOURNAL" for Dec. 22 brought once more into prominence, in connection with the gas industry, Dr. Alex. C. Humphreys, who is so well-known in this country as a member of the firm in the title of which his name is associated with that of Mr. A. G. Glasgow. It may be remembered that the latter gentleman had prepared a paper on "The Policy of Gas Enrichment" for the last annual meeting of the American Gaslight Association; but, owing to a serious attack of illness, he was unable to read it. Dr. Humphreys, however, who was himself set down for a contribution to the proceedings, represented his friend, and not only read the paper for him, but, as we have recorded, replied to the remarks made upon it. It is not with the intention of entering into the controversy raised over the subject dealt with by Mr. Glasgow that we now refer to it, but to give a few particulars of the life-work of the man who, by the accident of illness, was unexpectedly drawn into it. Dr. Humphreys, as our readers will probably recollect, was selected in the summer of 1902 as the successor of the late Professor Henry Morton in the presidency of the Stevens Institute of Technology at Hoboken; and it is for this recognition by the Trustees of that establishment of his ability, by his antecedents, to fill this notable position thoroughly satisfactorily, that we avail ourselves of what appears to be an opportune occasion to reproduce from a recent number of the "Engineering Record" the following sketch of his career, which is accompanied in our contemporary by a portrait of the subject of their appreciative remarks.

American engineers have shown such a breadth of view, that many of them have been called from positions where their work was wholly technical to become the managers of great enterprises. It very rarely happens, however, that a man who has won marked distinction as an engineer and a manager of a great railway or industry, feels called upon to accept a position of such responsibility as that of president of a technical school. This, however, stands to the credit of President Alex. C. Humphreys, of the Stevens Institute, whose career is one which students in technical schools will find particularly instructive.

President Humphreys became an engineer much as other men have learned stenography or read law. He saw it would be useful to him, and accordingly he acquired the knowledge. Moreover, he was comparatively well along in years before the necessity of technical education was apparent to him. He was born in Scotland in 1851; his father (Dr. E. R. Humphreys) being a man of high scholarship. The family moved to Boston, and there the son became so interested in shipping, that he took the examinations for entrance to the United States Naval Academy. He was only fourteen years old at the time, and while he passed the examination satisfactorily, he was not of sufficient age to be admitted. To pass the time until he could enter the Annapolis school, he began work in an insurance office at Boston. A little later he joined the staff of the Guaranty and Indemnity Company of New York, in whose service he rose from a place as office boy to a position of high responsibility. By this time his naval aspirations had been considerably dampened, and by 1872 he was thoroughly absorbed in business affairs. At that time he was living at Bergen Point (N.J.); and the Directors of the local Gas Company were so favourably impressed by his ways, that they persuaded him to become Secretary and shortly afterwards Superintendent of the Bayonne and Greenville Gaslight Company.

The acceptance of this offer was the turning-point in his career. Up to that time he had been a business man, absorbed in commercial affairs, and finding recreation mainly in the management of various church works in which he has always been interested. Probably at that time the idea of becoming an engineer had never entered his head—not because engineering work was distasteful, but because the usefulness of it to him had not been proved. But, in the management of his little gas plant, the need of technical information gradually dawned upon him. For something like five years, he worked along in a routine way, showing business ability in the conduct of a small plant, but getting no nearer to the large affairs that he was confident he could manage with success. The gas industry at that time was almost dead Everything moved along in a rut, and Mr. Humphreys could not lift any feature of it out of its rut, because he was without the scientific information that would give him the fulcrum and the lever to make such changes. So far as his opportunities had gone, he had been successful; and before abandoning a field in which he felt himself well established, he resolved to secure a technical education, and thereby ascertain whether his processes of manufacture were capable of development.

At the time he was already considerably past the age at which most students at technical schools graduate. He had a family to support which made it impossible for him to give up his work at the Bergen Point plant, and so he was placed in the predicament of applying for special privileges at the school of which he is now President. Dr. Morton, with his rare insight into the character of the men passing under his charge, recognized the desirability of letting down the usual rules and regulations in the case of this applicant. He was admitted to the Institute with the understanding that he should attend the classes on at least two mornings each week. Dr. Morton estimated that in six years Mr. Humphreys might thus complete the full course of studies. He entered in 1877, twelve years after he had ceased the habit of regular study. At an age when his classmates were beginning their elaborate course of study to prepare them for technical subjects, he was earning his living, and even more. When he entered the Institute, he was already the executive of an enterprise of some importance, the Treasurer of his church, a member of the Bayonne Board of Education, and Foreman of the local Fire Department. He gave up none of these things. His technical education he looked upon as an incident in his business career, and not as something that would make him a little better man than those without such schooling. It was essential for his success, but nothing to be approached with fear or fasting. Consequently, it is not at all surprising that he completed it, even under the unfavourable conditions attending his hours of study, in three years instead of the four allotted to the course for regular students. He was a man, and accustomed to utilize time to the best advantage, when he began his school work at Stevens, and so he was able to go to the root of things as rapidly as if they were the business problems which presented themselves every day for his solution. The remarkable thing about his course is the high standing he won in his class (that of 1881) which was recognized by resolutions of commendation, and congratulation addressed to him by the Faculty on the 11th of June of that year. That a man of experience in business, pursuing technical studies for the purpose of developing, if possible, a moribund industry, should pass so well in all his courses, is an indication of the fine curriculum which Dr. Morton had adopted, as well as of the character of this unusual student. If any of those studies had not been of some benefit, it is not likely that an attempt to obtain more than a pass mark would have been made by a man with so many demands upon his time.

Soon after graduation, Mr. Humphreys had an opportunity to put his recently acquired technical knowledge to some direct service. This was when he became Chief Engineer of the Pintsch Lighting Company of New York. This system of gas illumination had won a position of high favour among European railway managers, but in the three years during which Mr. Humphreys was in charge of the technical work of the American Company, he added materially to the efficiency of the apparatus. He built many oil-gas works, conducted experimental work on a large scale, and, best of all, built up an organization for carrying on the business which enabled him to step out of its affairs with no serious detriment to its operations.

It was in 1885 that he undertook the supervision of new construction for the United Gas Improvement Company of Philadelphia, then in its infancy. A little later he became its Superintendent, then assumed charge of the contracting department, and finally became the Manager of all the Company's works. When he joined, the Company owned ten works; whereas in 1894, when he left, the number was nearly forty. He not only had to rebuild and enlarge these plants, but was also called upon to develop an organization for their economical and efficient management—no small task in the face of the competition of electric lighting companies. His most important technical achievement was the widespread introduction of the water-gas process, which was bitterly fought for a long time by Boards of Health as well as by private parties. But this is only one item in the long list of engineering accomplishments which marked his management of this great corporation. Important as these technical works were, we have long believed that the development of the system of management of gas properties with which his name will always be associated was an achievement of much higher merit. It is a mark of the highest order of intellect to organize a staff for the successful management of an industry worth $70,000,000, so that when the

time comes the master mind which built up the organization can step down and out without affecting the conduct of affairs. This involves not only a thorough grasp of all details of the work, but also a keen judgment of men, so that the staff brought together will work harmoniously and effectively in every department.

Early in 1892, Mr. Humphreys and Mr. Arthur G. Glasgow established the firm of Humphreys and Glasgow, Consulting Gas Engineers in London, and this has been successful from its inception. Two years later, on his resignation from the United Gas Improvement Company, he formed the firm of Humphreys and Glasgow, of New York, which has been equally prominent in the American field. Since entering into consulting practice, he has achieved a reputation as an engineer that is not confined to the narrow limits of gas engineering—a specialty presenting technical difficulties that few people appreciate. In many ways these recent years of professional work have been the most important in his career; for, after all is said, it is not until an engineer engages in independent practice that he is able to develop his individuality to the highest degree.

It is not in engineer work or as a manager of a great industry, however, that Mr. Humphreys will be best known, or his influence will be most felt. As the President of the Stevens Institute, he is doing more good than he can appreciate. Technical education to-day is in a transition stage. It is only a generation old. When the first schools were established, their courses were modelled very largely after those of colleges, and the instruction in science and its applications was a tentative rearrangement and extension of courses in schools of liberal arts. Then came the period when the first graduates went out into the world, and tried the value of their new-fangled education, and found it wanting in very many respects. Their complaints had an immediate result. Courses were highly specialized, and an attempt was made to teach a young man anything of an engineering nature in which he thought he was interested. Enormous laboratories of machinery, engines, electrical apparatus, and the like, were established. Courses were laid out in which a great number of subjects were taught at the expense of thoroughness in each of them. The catalogues of technical schools began to read like the bargain-day advertisements of department stores, where everything can be obtained at a reduced rate. The great engineers of the country were aghast at the madness that swept over such institutions, and they often expressed the wish that some strong man would step from their ranks and check this rank growth. Many schools have seen the error of attempting to teach a little of everything to young men, and remain conservatively attached to their love of thoroughness in fundamental studies which must be fully mastered in order to win complete success in any branch of engineering.

It has remained for President Humphreys, however, to state vigorously, from his high position as a man of large affairs and eminent engineering reputation, that the technical schools must stop their dilettantism and their flirtation with every speciality of engineering, and restrict their undergraduate work along a very few lines. His outspoken criticisms of technical education as it is viewed in some quarters have already caused a profound conviction of the need of more thoroughness and less display in many engineering schools. We are in a position to hear many criticisms of such schools; but we have yet to hear anything but the warmest praise for the good work for engineering education everywhere that President Humphreys is doing. The benefit of his convincing plea for thoroughness, saneness, and the inculcation of business habits, is something that the Stevens Institute must share with sister institutions. Few people recognize as yet what an impression his words and his methods are making on technical education; but those who do, sincerely hope that the disappointments and annoyances of the life of a school president will not lead him soon to abandon a work of such widespread importance.

THE TREATMENT OF DEPRECIATION.*

STILL another volume is before us of the useful series of handbooks that is being issued as "The Accountants' Library," which has already been referred to in the "JOURNAL" in connection with the subjects of "Gas Accounts" and "Municipal Accounts"—both earlier dealt with. The present volume (No. 26), which is written in the clear and concise style that has become characteristic of the series, deals with a very much more vexed question than has been the case with most, if not all, of its predecessors—that is, the principles on which it is desirable that provision for depreciation and reserve should be made in different cases. That the author (Mr. Lawrence R. Dicksee, F.C.A.) was aware of the difficulties by which his task was beset, is apparent from his Introduction, in which he admits that upon many of the various matters considered widely divergent views have been expressed by authorities *primâ facie* entitled to almost equal acceptation. In his view, however, much of the misapprehension that is rife has arisen either through the confusion of legitimate arguments with the statements of more or less "special pleaders," or through the confusion of what are legitimately matters of opinion with questions of scientific fact. He has accordingly endeavoured to clear the ground by separating opinions from facts, and more particularly by pointing to the consequences which must inevitably result from the following of any given line of action with regard to the matters with which he deals.

The first chapter discusses a point which has been insisted on times without number in the pages of the "JOURNAL"—the importance of depreciation—and we are entirely in accord with the author in his remark that the fact that adequate or inadequate provision for depreciation often makes the difference between a satisfactory and an unsatisfactory financial result, has at all times tended to the abuse of the term. His assertion that it would probably not be going too far to say that this abuse has in many notorious cases been deliberate, rather than unconscious, is strong, although there is but too much reason to believe that it is well founded. In order to confine the treatise within reasonable limits, fixed assets—*i.e.*, lands, buildings, plant, and machinery occupied and worked in the course of trade—alone are taken into account; but it is pointed out that of necessity everything that can be urged with regard to the need for making due provision for depreciation of such property, applies also to floating assets. The question that has to be faced in the case of every business concern, says Mr. Dicksee, is that, by whatever name it be known, provision must, in some form or another, be made for the maintenance of the fixed assets, if it be desired that the undertaking should retain its permanent character; and, this being granted, he devotes the following chapters to an explanation of the methods to be adopted towards this end. The best means of dealing with all the more ordinary classes of wasting assets are plainly discussed; and accounts are set out to illustrate the working of the different systems. The chapters treating of the depreciation of plant and machinery, loose tools, horses, &c., may perhaps be of more special interest to our readers; but the others (which include two dealing respectively with reserve funds and sinking funds) will also be found to contain much useful information.

The last chapter of the book, however, is the one to which we would call particular attention, for it refers to by far the most urgent aspect of this troublesome question—that is to say, the position of the trading departments of local authorities in regard to depreciation. This is a really good, sound, commonsense essay on the subject, and is alone sufficient to justify the existence of the book. It should be read by every member of every municipality—and how many there are!—who are offenders in this respect. And not only they, but ratepayers also, would, by careful consideration of what Mr. Dicksee has to say, get a clearer insight than most of them now possess into a matter which, if it does not already vitally concern them, will assuredly do so at some future—and probably not far distant—time. The popular misconception with regard to depreciation in connection with local authorities, he remarks, is that, by some semi-miraculous means, these undertakings are asserted to be on a plane of their own, and beyond the reach of those risks that operate in the case of ordinary business concerns. However absurd this may at first sight appear, it is hard to find any more reasonable explanation of the views that obtain so largely at the present time. There is, of course, another well-used argument against the need for the provision of depreciation by local authorities—viz., the fact that the loan capital has to be redeemed within a fixed period by means of a sinking fund. But it is not likely that anyone, at any rate after reading what the author has to say upon it, will continue to look upon this as a more reasonable explanation than the other.

Altogether, Mr. Dicksee is to be congratulated upon the manner in which he has performed his task. The book is a small one (although none the worse for that); and the style in which it is written does not confine its usefulness to the professional accountant, for whose benefit, however, it has, of course, been more particularly compiled.

* "Depreciation, Reserves, and Reserve Funds," by Lawrence R. Dicksee, M.Com., F.C.A. London: Gee and Co.; 1903. [3s. 6d.]

HINTS ON ACETYLENE.*

WITH the object of enabling amateur mechanics and others, having but few tools and appliances at command, to construct in an inexpensive way simple but thoroughly reliable acetylene generators, Mr. Cyril N. Turner has compiled a handbook (based on the results of his own personal experiments), which has been issued as one of the "Model Engineer" series. Acetylene, of course, is no longer the mystery that it once was to the general public; but there must still be a great many people who do not thoroughly understand the process by which the gas is generated, and who would like to do so. To them, as well as to those who aspire to make their own apparatus, Mr. Turner's little work may be commended. Indeed, we would rather see the book in the hands of persons who may be wishful to increase their knowledge on the subject of acetylene gas, than in those of "amateur mechanics" contemplating the construction of their own generators. In saying this, no reflection whatever is intended on Mr. Turner's contribution to the literature on the question. His instructions are given in plain, non-technical language, and should be easily understood(But, at the same time, bearing in mind the fact (emphasized by the author himself in his preface) that the very

* "Acetylene Gas: How to Make and Use It," by Cyril N. Turner. London: Percival Marshall and Co.; 1904. [6d. net.]

greatest care is needed if all possibility of disaster is to be eliminated, it must be admitted that the manufacture of acetylene plant, even on a small scale, is not a thing to be lightly undertaken by amateurs.

Mr. Turner begins by giving a brief outline of the history of acetylene, its composition, and its chief advantages; and he then describes the four systems which are in general use for the production of the gas, and the respective advantages of automatic and non-automatic generators. For installations of moderate size, and where the saving of space is a great object, he favours the automatic type; and therefore he deals more particularly with appliances which come within this category. Fully illustrated descriptions are given of the construction of automatic generators, on the system of carbide descending into water and being drawn out again, of carbide dropping into a bulk of water, and of water rising in excess to the carbide. The principle of water dripping on to the carbide is discarded, as being undesirable except for quite miniature generators—such as bicycle lamps, &c. Next comes a chapter containing hints on fitting up pipes, burners, and purifiers; and in this connection many different kinds of burners are enumerated and illustrated, and the manufacture of a cheap purifier is explained by the aid of a sectional drawing. Some interesting information is also given on the utilization of acetylene for the purpose of increasing the power of small gas-engines—that is to say, with regard to its employment as an enricher of coal gas or petrol vapour; and the author even tells his readers how to make a petrol carburettor for use in conjunction with acetylene. After another earnest warning that acetylene is not to be played with, and that extreme caution is necessary in making experiments, Mr. Turner concludes by giving some abstracts from the regulations enforced by the authorities with regard to the storage of carbide. A perusal of these should be of great assistance in impressing upon novices the dangerous character of the material with which they have to deal.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 37.)

BUSINESS last week on the Stock Exchange was very quiet; the closing on Friday tending to dislocate operations. The adjustment of a light settlement was the chief item. The general tendency was very depressed; each successive real fact transpiring in reference to the Far East being calculated to increase the gloom. Prices fell freely, and closed at about their worst. In the Money Market, there was the usual heavy demand at the end of the year; but discount rates were quite easy. In the Gas Market, business in the aggregate presented a fair volume; but the bulk of it was all in the biggest issue. The tendency, however, was a great improvement on the preceding week; and several quotations show moderate advances. In Gaslight and Coke issues, the ordinary was in good demand; and, opening at 88, it soon ran up to 90, at which figure it repeatedly changed hands. One dealing in the maximum at a good price was all that was transacted in the secured issues. South Metropolitan was very quiet, but buoyant—opening at 116¼, and closing at 119. One transaction only was marked in Commercial; but it was at top price. The Suburban and Provincial group was very quiet, and unchanged. Dealings in the Continental Companies were very light, and prices were poor, except for European. The remoter undertakings were unchanged. The Water Companies made further progress upward—more especially Kent and Southwark, whose claims have yet to be considered by the Arbitration Court, and a large number of quotations advanced.

The daily changes were: On Monday, New River, Southwark, and Kent new rose 5 each, and West Middlesex, both Lambeths, and Kent, 2½ each. On Tuesday, Gaslight ordinary gained 1. In Water, Kent moved up 5, Southwark 2, ditto debenture and Grand Junction 1 each. On Wednesday Tuscan debenture fell 1. In Water, Chelsea preference rose 2½, Southwark 1½, and East London 1. On Thursday, Tuscan debenture recovered 1, but Union preference fell 2. On Saturday, Gaslight ordinary and South Metropolitan rose 1 each.

We append, as usual, a comparative table showing the prices of Gas and Water Stocks on the last day of the year, and the corresponding prices of a year ago. The general fall in value of all securities will account for reductions in Gas quotations; while Water stocks have, of course, been, and still are, under the influence of the arbitration proceedings.

New capital was required by many Companies last year to meet outlay on additional works and plant necessitated by the increasing growth of the industry; but the dearth of money, and the congested state of the market for all high-class home investments, have been very unfavourable to bringing forward new issues. A considerable amount of capital has, however, been raised during the year for Gas Companies carrying on their operations, not only in London and the suburbs but also in the provinces—principally through the medium of the auction sales held periodically at the London Auction Mart by Mr. Alfred Richards—and, though prices have naturally been overshadowed by the weakness of Consols and other disquieting features, yet (with but one or two unimportant exceptions) the whole of the issues have been placed on what must—having regard to the trend of other markets—be considered satisfactory prices.

GAS COMPANIES.	Prices on Dec. 31, 1902.	Prices on Dec. 31, 1903.	Gain or Loss.
Alliance and Dublin, 10 per cent.	18—19	18½—19½	—
Do. 7 per cent.	12¼—13½	12½—13½	—
Bombay, Limited	5⅝—6	5⅝—6	—
Do. New, £4 paid	4—4¼	4—4¼	—
Brentford, Consolidated	247—252	228—233	—19
Do. New	181—185	171—176	—9½
Do. 5 per cent. Preference	134—139	130—135	—4
Do. 4 per cent. Debenture Stock	110—113	103—108	—6
Brighton and Hove, Original	207—212	207—212	—
Do. A Ordinary Stock	152—157	145—150	—7
British	39½—40½	38½—3 1/8	—1
Bromley, Ordinary 5 per cent. A	22—24*	115—120	—
Do. 3½ per cent. B	18—20*	88—93	—
Buenos Ayres (New), Limited	10½—10¾	10½—10¾	—
Do. 4 per cent. Debenture	92—94	91—93	—1
Cagliari, Limited	23—25	22—24	—1
Cape Town and District, Limited	14½—15½	14—15	—½
Do. 6 per cent. 1st Mort.	53—55	52—54	—1
Commercial, 4 per cent. Stock	250—260*	104—107	—
Do. 3½ per cent. do.	200—205*	97—100	—
Do. 3 per cent. Debenture Stock	130—134*	84—87	—
Continental Union, Limited	133—138	115—120	—18
Do. 7 per cent. Preference	140—145	128—133	—12
Crystal Palace Ordinary 5 per cent. Stock	117—122	110—115	—7
Do. 5 per cent. Preference	120—125	118—123	—2
Do. 5 per cent. Deb. Stock	..	135—138	—
European, Limited	18—19	18½—19½	+½
Do. £7 10s. paid	13—14	13—14	—
Gaslight and Coke, 4 per cent. Ordinary	84—86	88—90	+4
Do. 3½ per cent. maximum	86—8[illegible]	86—88	—
Do. 4 per cent. Con. Pref.	110—112	107—110	—2½
Do. 3 per cent. Con. Deb.	91—93	85—87	—6
Hastings and St. Leonards, 3½ per cent.	..	90—95	—
Hong Kong and China, Limited	14½—15½	16—17	+1½
Imperial Continental	202—205	197—200	—5
Do. 3½ per cent. Deb. Red.	99—101	98—100	—1
Lea Bridge Ordinary, 5 per cent.	..	113—118	—
Liverpool United A	224—226	214—216	—10
Do. B	165—167	163—165	—2
Do. Deb. Stock	114—116	108—110	—6
Malta and Mediterranean, Limited	4—4⅛	4¼—4⅜	+¼
Metropolitan of Melbourne, 5 p. c. Deb.	104—108	101—105	—3
Do. Do. 4½ p. c. Deb.	103—105	100—102	—3
Monte Video, Limited	9—10	9—10	—
Newcastle and Gateshead, Consolidated	102—105	105—107	+2½
Do. 3½ p. c. Deb. Stk.	99—100	94—95	—5
Oriental, Limited	..	135—140	—
Ottoman, Limited	6½—7	5½—6⅛	—⅜
Plymouth and Stonehouse, 5 per cent.	..	123—128	—
River Plate, Ordinary	10½—10¾	10¾—11¼	+½
Do. 4 per cent. Deb. Stock	92—94	92—94	—
San Paulo, Limited	11⅛—12⅛	10½—11⅛	—1
Sheffield, A	236—238	240—242	+4
Do. B	235—237	240—242	+5
Do. C	233—235	239—241	+6
Shrewsbury, Ordinary, 5 per cent.	..	109—112	—
South Metropolitan, 4 per cent., Ordinary	119—122	115—118	—4
Do. 3 per cent., Deb. Stk.	92—94	86—89	—4½
Southampton, Ordinary	103—107	105—110	+2½
Do. 4 per cent. Debentures	102—105	102—105	—
Tottenham and Edmonton, A 5 per cent.	118—123	115—120	—3
Do. B 3½ per cent.	93—96	95—100	+3
Tuscan, Limited	7⅛—8⅛	8—9	+⅞
Do. 5 per cent. Deb. Red.	96—98	98—100	+2
West Ham, 5 per cent. Ordinary	10—11*	94—98	—

* Previous to Conversion.

WATER COMPANIES.	Prices on Dec. 31, 1902.	Prices on Dec 31, 1903.	Gain or Loss.
Chelsea, Ordinary	310—320	300—310	—10
Do. 5 per cent. Preference	150—155	140—145	—10
Do. 4½ per cent. Preference Stock, 1875	138—143	130—135	—8
Do. 4½ per cent. Debenture Stock	140—145	132—137	—8
East London, Ordinary	225—235	217—220	—11½
Do. 4½ per cent. Deb. Stock	142—147	133—138	—9
Do. 3 per cent. Deb. Stock	97—99	87—90	—9½
Grand Junction 10 per cent. maximum	115—120	133—136	+17
Do. 4 per cent. Deb. Stock	125—130	115—120	—10
Kent	300—310	290—300	—10
Do. New, 7 per cent. maximum	200—210	195—205	—5
Lambeth, 10 per cent. maximum	305—315	285—295	—20
Do. 7½ per cent. maximum	220—230	210—220	—10
Do. 4 per cent. Debenture Stock	125—130	115—120	—10
New River, New Shares	395—405	310—320	—85
Do. 4 per cent. Debenture Stock	125—130	115—120	—10
Southwark and Vauxhall, Ordinary	207—212	243—248	+36
Do. Do. 7½ per cent. max.	200—210	195—205	—5
Do. Do. 5 per cent. Pref.	151—154	138—143	—12
Do. Do. 4 p. c. A Deb. Stk.	125—130	117—120	—9
West Middlesex	295—305	290—300	—5
Do. 4½ per cent. Deb. Stock	140—145	130—135	—10
Do. 3 per cent. Deb. Stock	97—99	88—91	—8½

The death of Sir William Allan, M.P., which took place at his residence in Sunderland on Monday evening last week, after a short illness, is noticed here from the fact that, having been himself a working man, he tried, on becoming an employer, to ameliorate the condition of the men engaged in his works by shortening their period of labour to eight hours per day. He offered them this concession on condition that they would consent to a reduction of 5 per cent. in their wages for six months; the difference to be returned in full if at the end of that time no loss had been sustained through the change. The terms were accepted. The experiment proving successful, Sir William returned the 5 per cent.; and the eight-hour system has been continued, to the advantage alike of employer and employed.

THE COGAN EXTENSIONS OF THE CARDIFF CORPORATION WATER-WORKS.

By Neil J. Peters, Assoc.M.Inst.C.E., Assistant Water Engineer.

This was the final paper submitted at the winter meeting of the British Association of Water-Works Engineers. The first part of the communication was devoted to an explanation of the original high-level scheme which was carried out, in connection with the Cardiff Water-Works, for the supply of the Penarth district. A pumping-station was erected adjoining the then existing Cogan reservoir, a high-level reservoir was built at Llandough, and a pumping and gravitation main 9 inches diameter was laid from the above reservoir to the pumping-station, and thence to Penarth. In 1898, a larger trunk main had to be put down from Penarth to the Cogan pumping-station; and then, in the summer months of 1899, both the existing engines had to be worked in order to maintain the supply, which had reached an average of 375,000 gallons a day. This briefly was the position, as gathered from the detailed statement in the paper, when the Water Engineer (Mr. C. H. Priestley, M.Inst.C.E.) was instructed to report generally on the supply to the Penarth high-level district. The succeeding part of the paper states the result.

The following works were proposed: (1) To construct a reservoir of 2 million gallons capacity on a site at a higher elevation than the existing Llandough reservoir; (2) to lay an 18-inch diameter main from the proposed reservoir to the Cogan pumping-station; (3) either to increase the pumping plant at Cogan or else lay a gravitation main from the high-level reservoir at Rhubina to the proposed reservoir near Llandough. The cost of the alternative schemes was estimated to be: Additional pumping plant capable of pumping 600,000 gallons per twenty-four hours (thus duplicating the existing engine power with modern and economical machinery), £2480; laying the proposed gravitation main, 18 inches diameter, capable of discharging a million gallons in twenty-four hours, £23,572. This gave a difference of £21,092 on the initial cost in favour of the pumping scheme. But it was further necessary to arrive at the annual charge, taking into consideration the repayment of the capital being spread over a number of years, together with interest and working expenses. This was estimated as follows:—

Pumping Scheme.

	Capital paid off in 10 Years.	15 Years.	30 Years.
Interest and repayment of capital	£298	£215	—
Working expenses	484	540	—
Estimated annual expenditure	£782	£755	—

Gravitation Scheme.

Interest and repayment of capital	—	£2050	£1237
Working expenses	—	25	25
Estimated annual expenditure	—	£2075	£1262

These estimates clearly showed that, as regards annual charge, the pumping scheme would be more economical for a period of about fifteen years; and as the consumption at the present rate of increase will probably not exceed 600,000 gallons per day at the end of fifteen years, it will be seen that the pumping scheme would be the best for that period. The scheme was approved, and has been carried out in the following order: The machinery was supplied by Messrs. J. Simpson and Co., Limited. The foundations and walls of the engine-house below the floor-level were built of Portland cement concrete and best hard red bricks in cement mortar; above the floor the walls were built of brickwork in lime mortar, faced with coursed limestone to match the existing buildings. The boiler was fixed alongside the existing one, where space had been provided for the purpose. The plant consists of a pumping engine and boiler, together with superheater, feed pump, the necessary steam and water pipes, &c.

Type of Engine and Pump.—Vertical Worthington six-cylinder triple-expansion surface-condensing engine, fitted with semi-rotative main steam-valves and adjustable cut-off valves, acting directly on four single-acting plunger pumps, each of the two plungers working into two of the pump barrels. The suction and delivery valves are of the usual Worthington type. The surface condenser is located on the delivery side of the pump, and all the water pumped by the engine passes through the condenser. The air-pumps, two in number, are of the horizontal double-acting type, operated by bell-crank connections from the engines.

Size of Engine and Pump.—Two high-pressure steam-cylinders, 6 inches in diameter; two intermediate steam-cylinders, 9 inches in diameter; two low-pressure steam-cylinders, 16 inches in diameter; two double-acting water-plungers, 8 inches in diameter—all having a uniform stroke of 15 inches.

Boiler, &c.—The boiler is 14 ft. by 5 ft. 6 in. diameter, and works at 100 lbs. pressure per square inch. The superheater is fixed in the flue at the back end of the boiler, and consists of eight steel tubes through which all steam passes before reaching the engine.

Guarantee.—The makers guaranteed the plant to pump 400,000 gallons in twelve hours out of the Cogan reservoir, through the existing 9-inch diameter main, into the new reservoir at Leckwith, when not consuming more than 3 lbs. of best Welsh steam coal per indicated horse power per hour. An eight-hour test was made on Aug. 21 last; and the water delivered, as measured by the pumps, was over 8½ per cent. more than the guaranteed quantity. The total number of gallons pumped was 289,723, or 434,583 gallons per twelve hours.

The test was satisfactory—especially in regard to the coal consumption; and the plant has been at work more or less every day since it was started. Some trouble was experienced with the superheater at first, owing to its leaking where the steel tubes enter the cast-iron headers. This was ultimately stopped by making the new tubes a few inches longer, and so keeping the joint out of the direct current of the flue gases. The author is inclined to the opinion that the trouble was in great measure due to the banking of the fire every night for ten to twelve hours.

The 9-inch diameter delivery-main from the new pump was laid parallel to the existing 9-inch diameter delivery-main from the old pumps for a short length within the Corporation boundary. Then, by means of angle branches and valves, both the mains were connected to the existing 9-inch main to Llandough reservoir; the new 9-inch main being also connected to the existing 18-inch gravitation main to Penarth. The existing 9-inch main to Llandough reservoir was then disconnected from the above 18-inch gravitation main, and the latter was continued to Llandough reservoir, where a 12-inch outlet-pipe was fixed. The existing 9-inch main from the Cogan pumping-station to the Llandough reservoir was continued to the Leckwith reservoir. This arrangement of mains and valves provide for pumping into either reservoir, or into the gravitation main, with either the new or the old plant as desired.

The estimate for laying the mains was £3940; the actual cost being £3875. The trench had for the most part to be excavated through beds of limestone averaging 6 inches in thickness, which necessitated the use of steel wedges and sledge-hammers in lieu of the ordinary picks. Water was also met with in considerable quantity. The whole of the work was done by Corporation workmen. The pipes and special castings were supplied by Messrs. Cochrane and Co., of Dudley, and the valves by Glenfield and Kennedy, Limited, of Kilmarnock.

The new high-level reservoir at Leckwith is situated about 400 yards from the Llandough reservoir. It is being constructed below the original surface of the ground, except at the south-east corner, where there will be a small embankment with a maximum height of 5 feet. The floor of the reservoir will be formed by a foundation of lime concrete not less than 10 inches thick, upon which will be laid Callender's bitumen sheeting. Upon this will be 4 inches of fine Portland cement concrete; the upper surface being worked to a smooth finish, with a fall towards the wash-out which will be fixed in the centre of the reservoir. The walls are of 9-inch and 14-inch brindle brickwork in cement mortar, faced with best Staffordshire blue bricks, and backed with cement concrete. The total thickness varies from 6 feet at the bottom to 2 ft. 3 in. at the top-water line. The back of the wall is vertical, while the face is an arc of 60 feet radius. The bitumen sheeting on the floor is turned up 3 feet into the centre of the cement concrete of the wall. All the concrete used in the construction of the reservoir will be composed of three parts of broken stone (2-inch gauge, or finer if required), two parts of sand, and one part of Portland cement or Aberthaw ground lime.

The arrangement of pipes already referred to was made so that water could be pumped through the 9-inch main up to the top-water level of the reservoir—300 feet above Ordnance datum. The reservoir will have a capacity of 2 million gallons; the principal dimensions being 168 feet long, 138 feet wide, and 15 feet deep. The 18-inch inlet-pipe is fixed 2 feet above the bottom, so that it can be used as an outlet if required. The 20-inch outlet-pipe will be connected to a float, which will cause it to automatically draw off the water from about 2 feet below the surface. An electrical water-level transmitter will be fixed and connected to the indicator in the engine-house at Cogan by a cable, which was laid in the same trench as the new main. The top water and the finished path around the reservoir are at the same level. The walls will therefore be carried up 2 feet high and 18 inches wide, to prevent game, rubbish, &c., falling into the water. The coping will be made (on the works) of Portland cement concrete, 4 ft. by 2 ft. by 8 in. deep, with two chamfered edges.

At the time of writing, the greater part of the excavation was finished, the walls were about 10 feet high, and the bottom was commenced; but as the reservoir was not complete, the actual cost of the various works could not be given.

Discussion.

Mr. W. Matthews (Southampton) said he unfortunately had had a similar experience to the author with a superheater; and it was due to steam condensing in the superheater during the time the fires were banked. The remedy he had found was to allow a little steam to pass away from the superheater during the whole time the boiler was standing. The superheater he had to deal with was, he believed, of the same type as that to which Mr. Peters referred.

Mr. F. J. Bancroft (Hull) stated that he adopted Schworer

superheaters five years ago; and there had not been the slightest trouble with them. They would, indeed, hardly know of their existence if it were not for the economy that resulted from their use.

Mr. MATTHEWS: Do you bank the fires?

Mr. BANCROFT replied that they were used practically the twenty-four hours through. [Mr. MATTHEWS: That is the difference.] Occasionally they stopped for four or five hours at a time; but they did not bank-down for twelve hours. He might say that the economy they had effected with this and the other improvements in the plant enabled them to give 1 pump horse power with under 15 lbs. of steam per hour. The other point he wished to mention was the size of the pumping plant referred to in the paper. The number of gallons of water pumped per twelve hours was 434,583, or less than ½ million; while the size of the reservoir was 2 million gallons. He should like the author to justify the size of the reservoir for a pumping plant of the capacity stated. To his (Mr. Bancroft's) mind, it appeared to be totally unnecessary. If they made an examination of the quantity of water pumped per day into the summit reservoir, they would find its capacity might be considerably less. He should like to know if any investigation had been made before the size of it was determined.

Mr. E. A. B. WOODWARD (Wolverhampton), in the first place, referred Mr. Peters to the period of years in which the comparison of the two schemes was taken, and asked him whether the fifteen years for the pumping scheme was the maximum period allowed, or was it due to the action of the Local Government Board. It appeared to him that, if this district was to be permanently supplied, and was a growing one, it would have been true economy on the part of the Cardiff Corporation to have gone in for a gravitation scheme in preference to the pumping scheme. If in fifteen years they had either to enlarge or renew the whole of the plant, it was certainly money thrown away. With regard to the pumping plant, he saw that they had put down triple-expansion engines; and the pressure—100 lbs.—seemed extremely low for that type of engine. This raised a question of whether they got any advantage from the three cylinders; it seemed to him they would get as good an economy with a compound engine.

Mr. PETERS, replying first as to the size of the reservoir, said the idea was that the scheme would ultimately be by gravitation; and it was decided that it would be better, while building a reservoir, to construct a rather larger one than would be necessary in connection with a pumping scheme. Then another thing which lent weight to the decision was that the existing plant, although capable of pumping the same as the new plant, was of a very antiquated type. It consisted of two engines, with 12-inch diameter cylinders; and these meant a very heavy steam consumption. This was the reason the reservoir was designed to contain 2 million gallons, instead of about 1 million or ¾ million as would otherwise have been necessary. The number of years taken was decided really on the estimated growth of the population. The high-level district was growing rapidly; and it was estimated that, at the end of fifteen years, the consumption would be equal to the maximum output of this pumping plant. Beyond that period, if the pumping plant was still kept in operation, it would be necessary to go in for an extension; and this would, of course, raise the capital expenditure. Actually, the Local Government Board granted thirty years on the pumping machinery.

THE RAINFALL OF THE PAST YEAR.

In the paper read by Professor Henry Robinson at the last meeting of the British Association of Water-Works Engineers, on "The Storage of Flood Water," the phenomenal rainfall of the past year came in for a good deal of attention. The author of the paper produced a number of figures bearing on the subject; and Mr. C. E. Jones supplied the total of the records made by him privately during the year at Leyton, Essex. The last-named gentleman predicted that the complete year would have seen a fall of over 3 feet of rain; and the prediction has proved correct.

Rainfall in the Year 1903, at Leyton, Essex.

Month.	Depth in Inches.	Greatest Fall in 24 Hours. Depth.	Date.	Rainy Days.
January	1·93	0·71	4	16
February	0·67	0·28	27	9
March	2·19	0·32	2	18
April	1·89	0 52	28	13
May	1·52	0·44	3	18
June	5·97	1·64 1·28	14 13	10
July	6·31	2·79	23	12
August	4·45	1·55	24	18
September	2·59	1·01	4	12
October	6·05	1·00	11	27
November	1·53	0·88	27	12
December	1·17	0·32	10	10
Total	36·27	—	—	175

Remarks.—In 1902, at Leyton, there was a total fall of 21·18 inches, so that 1903 shows an increase of 15·09 inches The rainy days in 1902 numbered 163, as against 175 in 1903—an increase of twelve days, of which October accounts for eleven.

A TOUR OF EUROPEAN GAS-WORKS.

In the earlier months of 1903, Herr O. Mœgelstue, the Engineer of the Municipal Gas-Works at Christiania, made a tour of various cities in Denmark, England, Germany, and Holland, with the object of visiting the gas-works at these places, and thereby becoming more closely acquainted with the various advances of modern gas manufacture. The towns he visited were: In England—Newcastle, Manchester, Liverpool, Warrington, Birmingham, and London. In Scotland—Edinburgh. In Holland—Amsterdam, Haarlem, Dordrecht, and The Hague. In Germany—Aix-la-Chapelle, Cologne, Dessau, Dresden, Berlin, and Stettin. In Denmark—Copenhagen. In Sweden—Gothenburg. Herr Mœgelstue collected a number of statistics relating to the quantity of gas produced and consumed in the various countries, the prices charged, &c. These he has recently published in the form of a report to his Municipal Council, from which we give extracts of more general interest.

From a table, it appears that the gas produced in the various countries per head of the population of the towns which are supplied with gas was, for 1901-1902, as under—

Norway	1342 cubic feet.
Sweden	1916 ,, ,,
Denmark	3388 ,, ,,
Germany	2612 ,, ,,
Holland	3018 ,, ,,
Great Britain and Ireland	5224 ,, ,,
England only	5506 ,, ,,

In connection with these figures, the author remarks that in both Denmark and Germany there are a small number of private gas-works whose working results are not published, and are therefore not embodied in his statistics.

The quantity of gas produced per head for some of the towns visited, and the average price per 1000 cubic feet for 1902, are given as follows:—

	Cubic Feet per Head.	Price per 1000 Cubic Feet.
Christiania	1553 ..	3s. 4d.
Stockholm	3177 ..	3s. 6d.
Berlin	3282 ..	3s. 9d.
Amsterdam	3741 ..	3s. 2d.
Copenhagen	4165 ..	3s. 3d. to 6s. 5d.
The Hague	4236 ..	2s. 9d.
London	6248 ..	2s. 5d. to 3s. 1d.
Manchester	7307 ..	2s. 5d.
Liverpool	7448 ..	2s. 8d.
Newcastle	9636 ..	2s. 0d.

The following table gives the number of meters per 100 inhabitants in 1902, and the gas consumption per meter for 1901:—

	Number of Meters per 100 Inhabitants.	Gas Consumption per Meter. Cubic Feet.
Christiania ..	2·2 ..	41,654
Stockholm ..	16·3 ..	16,379
Copenhagen ..	27·7 ..	15,708
Berlin ..	about 7 5 ..	32,829
Amsterdam ..	10·0 ..	34,029
The Hague ..	11·3 ..	34,241
London ..	about 12 0 ..	..
Manchester ..	24·3 ..	31,522
Liverpool ..	19·0 ..	..
Newcastle ..	14·0 ..	..

The next table shows that the quantity of gas produced in Christiania had gradually increased since the erection of the works in 1848 to 353,000,000 cubic feet in 1902; while that produced in Copenhagen increased from 76,600,000 cubic feet in 1858 to 1,694,400,000 feet in 1902, and that produced at twelve German towns by the German Continental Gas Company increased from 76,600,000 cubic feet in 1857 to 2,118,000.000 feet in 1902. The gas produced per head of the population, increased in Christiania from 70 cubic feet in 1848 to 1553 feet in 1902, and in Copenhagen from 564 cubic feet in 1858 to 4165 feet in 1902. Comparing Christiania with other towns, the author observes that at Newcastle, the present annual gas production is about seven times greater per inhabitant than at Christiania. At Edinburgh, the annual gas production is about three times greater per inhabitant than at Christiania; at Birmingham and Manchester, five times greater; and at London, four times greater per inhabitant. The Beckton works alone produce yearly about 66 times as much gas as the Christiania works. At Amsterdam, The Hague, Berlin, and Copenhagen, the yearly gas production is also many times greater than at Christiania; and at all these towns new gas-works or extensions have either been erected or projected.

A further table shows the increase in the number of penny-in-the-slot meters in some of the towns as follows:—

		Meters.		Meters.
London ..	1892 ..	1500 ..	1902 ..	139,100
Manchester ..	1893 ..	0 ..	,, ..	38,500
Liverpool ..	1892 ..	1000 ..	,, ..	26,000
Copenhagen ..	1897 ..	0 ..	,, ..	12,000
Amsterdam ..	1898 ..	0 ..	,, ..	16,000

With regard to the various makers of prepayment meters, the author gives the preference to a Dordrecht firm.

The second part of the report deals with the gas-works them-

selves, and their various apparatus, the transport and storage of coal, retort-houses, storage and disposal of coke, condensers, exhausters, cyanide, naphthalene and ammonia washers, purifying-houses, &c. The author seems to have been particularly impressed with the construction and arrangement of the retort-house at the Imperial Continental Gas Company's works at Mariendorf, Berlin, sectional plans of which are appended to his report. On most other points, too, he has apparently been more favourably impressed by the gas-works in Germany than by those in this country. The "Duplex" station gas-meter and consumers' meter come in for a large share of his admiration. In writing of gasholders, the two types of English manufacture in which the usual guide-framing is dispensed with, are described. With regard to the spiral-guided system, patented by Gadd, the author states that he saw a holder on this principle at Birmingham, and that it was said to work satisfactorily. A section of a holder on the wire-rope principle, as constructed by Messrs. Ashmore, Benson, Pease, and Co. in several English towns, is given in the report. The author remarks that it will be interesting to observe the further results of practical experience of these systems of gasholder construction.

Gas mains and pressure have a couple of pages devoted to them; and a little is then said on the various uses or applications of gas for lighting and technical or industrial purposes. The author did not consider the street lighting in England good, on the whole; he saw too few Welsbach lights, and still far too many old flat-flame burners. With reference to street lighting, London was foremost of English towns; Manchester, for example, except in a few of the main arteries of traffic, being, in his opinion, very badly lighted.

In Holland, Germany, and Denmark, on the contrary, Herr Mœgelstue found the street lighting good. The devices used in Germany for automatically lighting and extinguishing the public lamps are mentioned and explained, as are likewise the Lucas and Selas lamps, the Millennium light, and other intensifying burners. In conclusion, gas-engines, gas-stoves, and gas cooking and heating apparatus are touched upon; but the author met with little of any special interest in connection with them.

CYANOGEN RECOVERY BY BUEB'S PROCESS, AND THE REMOVAL OF NAPHTHALENE.

Herr Körting, the Manager of the Hanover Gas-Works, has described at a meeting of gas engineers of Lower Saxony his experiences with Bueb's process for the extraction of cyanogen from coal gas; and they are reported in a recent number of the "Journal für Gasbeleuchtung."

Steam-jet exhausters are in use at the works; and the order in which the apparatus between the retort-house and the purifiers is operated is somewhat unusual. A "Standard" washer, with six chambers, is used for both naphthalene absorption and cyanogen extraction. It is worked at a temperature of about 95° Fahr. The first two chambers are charged with oil for absorbing naphthalene. The oil is run out of the machine into the tar-well when it has taken up about one-fourth of its weight of naphthalene. It costs about 45s. a ton, and sells, after use, for about 25s. The removal of naphthalene is not completely effected, and on one occasion the condenser which is next in series after the washer has been choked with it, while the subsequent apparatus remained free. It would seem desirable to have two washers, so that one of them should always be in action. The last four chambers of the washer are devoted to cyanogen extraction. The sulphate of iron is dissolved in a cast-iron vessel provided with stirring apparatus; and the solution is then run into the fourth chamber, where it remains until the sulphate is wholly converted into sulphide of iron, whereupon it is pumped into the next chamber. The wear and tear of the machine is very great, and the supervision is costly, as an attendant is required day and night. The ammonia in the cyanogen sludge does not fetch so much as that in ordinary gas liquor. About 4 oz. of cyanogen are now recovered per 1000 cubic feet of gas. The oxide is kept in use in the purifiers until it contains about 50 per cent. of sulphur, when it fetches 5s. per ton.

Herr Körting's remarks were discussed very fully by some of the gas engineers present at the meeting. Herr Häse, of Lubeck, Herr von Feilitzsch, of Brunswick, Herr Mohr, of Schleswig, and Dr. Leybold, of Hamburg, agreed that the extraction of naphthalene by means of oil washing was frequently incomplete. Some speakers considered it essential that the washing should take place on the cooled gas, while others thought a distinct washer should be devoted solely to the removal of naphthalene.

Pig Iron in 1903.—According to Messrs. Bolling and Lowe's review of the iron and steel trade of the year, England's output of pig iron may be taken at 8 million tons, Germany's at upwards of 9 millions, and America's at 19 or 20 million tons. Our output is 700,000 tons lower than that of 1902, a trifle better than that of 1901, a million tons less than in 1900, nearly 1½ million tons lower than in 1899, and substantially lower than in 1898 or the two preceding years.

THE SIMMANCE-ABADY "FLICKER" PHOTOMETER.

At the Meeting of the Physical Society on the 11th ult., a paper on the above subject was read by Mr. J. F. Simmance. The following abstract of it, with notes of the discussion to which it gave rise, are taken from the "Chemical News."

The principle of the "Flicker" photometer, discovered by Professor O. N. Rood ten years ago, has frequently been remarked upon; but attempts to design a reliable apparatus depending upon the principle have hitherto been unsuccessful. The authors, guided by the following rules, have designed a photometer which is capable of balancing and comparing the most violently contrasted tints. The light effects must be in juxtaposition, without any apparent division-line, and must move, oscillate, or rotate so that the point of juncture of the rays of the two lights passes and returns entirely across the vision-field. Any hiatus, or longer exhibition of one light than the other, biases the result. The observation surfaces, or surfaces upon which the light rays fall, must be at exactly the same distance from the eye, at exactly the same angle in relation to the line of sight, and must be of pure white, such as is afforded, for example, by a clean chalk, plaster-of-paris, magnesium carbonate, or barium sulphate. Any tint affects the accuracy of the result. The observation surfaces must also themselves in turn occupy the field of vision. Any apparent movement or optical illusion does not afford accurate results. Observations with the photometer, by operators suffering from colour-blindness, astigmatism, &c., make it certain that the relative intensities of two lights, whether of the same colour or different, can be accurately and easily gauged by the method. The authors submit that the Purkinje phenomenon does not affect the accurate working of the instrument, as it is a purely colour effect, and colour does not enter into consideration in this photometer. The photometer itself consists of a wheel of a white material with a specially shaped periphery, which wheel is caused to revolve before an eyepiece by means of a suitable motor. At right angles to the line of sight, and parallel with the axis of the revolving wheel, are the two lights undergoing examination, the rays of which fall upon the shaped periphery of the wheel, enabling the effect of each light to be seen in turn through the eyepiece.

Professor W. E. Ayrton said it was an important question to settle exactly what the photometer measured. The fact that different observers using the same photometer obtained the same results for the ratio between two lights did not prove that the instrument actually compared intensities. He had come to the conclusion that when the distances between the sources of light and the photometer were great, the results were not affected by the Purkinje effect.

Rev. T. C. Porter expressed his interest in the instrument, and said there was no doubt that the photometer measured intensity independent of colour. The results obtained directly from it agreed with those deduced by indirect methods from observations with ordinary instruments.

Mr. L. Gaster expressed his admiration for the photometer, and explained that this type of instrument was becoming more important because of the large number of improvements made during the last few years in the manufacture of incandescent lamps and arc-light carbons by the addition of other substances to the pure carbon. A great step towards the simplification of the process of photometry had been attained by Professor C. P. Mathews, by the aid of whose photometer one is enabled to get in one reading an illumination upon the screen proportional to the mean spherical intensity of the source.

Dr. W. Watson said the authors had compared a red light with a white one, and also a blue with a white. He asked if they had compared a red with a blue directly, and, if so, how the results agreed with those deduced from the comparison of both with a white light.

Mr. W. Duddell asked what was meant by the equality of two lights of different colours. Was it judged by the eye, the bolometer, or the "Flicker" effect? On account of the Purkinje effect, the law of inverse squares could not be used, and so he asked for the real fundamental relation underlying the use of the instrument.

Mr. Abady, replying on behalf of the authors, said the discussion had turned mainly on two points: (1) Does the instrument measure candle power? (2) Is it independent of the Purkinje effect? If a bunsen disc were used to compare the candle powers of two lights of the same colour, the grease-spot vanished at a certain point. If a "Flicker" photometer was substituted for the disc, the flicker disappeared at the same point. In both cases, candle power had been measured. In reply to Professor Ayrton, he said that results obtained from the photometer by different observers agreed among themselves and also agreed with results obtained from the bunsen disc photometer. With regard to the Purkinje effect, he did not think it affected the readings of a "Flicker" photometer, because the same values for the ratio between the intensities of two different coloured lights were obtained by varying the distances of the lights from the instrument within wide limits. Answering Dr. Watson, they had carried out the experiments suggested, and the results from the direct and the indirect comparison were in absolute agreement.

DEPOSITS IN PIPES AND WATER PURIFICATION.

At the Meeting of the Institution of Civil Engineers on the 15th ult.—the President (Sir W. H. White, K.C.B.) in the chair—two papers bearing upon the supply of water were read.

The first paper was by Professor J. Campbell Brown, D.Sc., the Public Analyst of Liverpool, and it dealt with "Deposits in Pipes and other Channels conveying Potable Water." The author, who, it may be remembered, brought the subject before the British Association at their meeting in Southport in September, directed the attention of his audience to the following matters: (1) Incrustations on iron pipes; their source, causes, and remedy. (2) Growths, more or less slimy, on the inner surfaces of pipes, culverts, and tunnels; and the composition of waters which produce different kinds of growths. (3) Loose deposits. Analyses were given of incrustations on iron pipes, and others of different kinds of waters were quoted; showing that these incrustations are due to oxidation of the iron of the pipes, whether widespread or in nodules, and that they are not limited to acid waters, but are common to acid, alkaline, and neutral waters. The remedy was briefly discussed, in the light of recent experiments as well as earlier observations. The author showed that growths or deposits on the inner surface of pipes are of two kinds: (1) Deposits of carbonates of alkaline earths from calcareous waters; (2) black slimy deposits, from the top, bottom, and sides of pipes and other channels conveying certain waters, chiefly from Welsh sources. Investigations were recorded and detailed evidence was adduced showing that these slimy deposits are produced by gelatinous and filamentous iron organisms which grow and extract iron from the water, and die at one end while they grow at the other. Solid rock particles are entangled in this slime. Binoxide of manganese is deposited by chemical action; and this also is entangled in the mass of the gelatinous iron organisms. Analyses were given of waters which do, and a variety of waters which do not, support the growth of this slime, and deductions were drawn as to the constituents of the waters on which these growths depend. Experiments undertaken with the view of ascertaining the conditions favourable to the growth, and the conditions which would prevent the multiplication, of these organisms and the growth of the slime, were described. Microphotographs were given of the growths at different stages, and the results of the experiments were described and discussed, in order to arrive at a correct theory, and so at a practical result.

The second paper was on "The Purification of Water Highly Charged with Vegetable Matter, with special reference to the Effect of Aëration;" the authors being Mr. Osbert Chadwick, C.M.G., M.Inst.C.E., and Mr. Bertram Blount, Assoc.M.Inst.C.E. The paper treated of the nature of tropical waters collected in regions free from ordinary sources of contamination, but containing large quantities of dissolved vegetable matter. These waters, wherever their place of origin, present great similarity of composition; samples from Mauritius, the West Coast of Africa, Uganda, and the West Indies having the same characteristics. In all cases contamination was caused by the water remaining stagnant or flowing slowly through regions rich in vegetation, which by its decay produces a large quantity of vegetable *débris* absorbable by the water. The purification of waters of this class is very difficult. The authors have found by experiment that treatment with iron is generally efficacious; but it must be more thorough than is necessary with ordinary water supplies, and systematic aëration is requisite in order to ensure an abundant supply of oxygen. Various methods were tried, and finally an apparatus was devised in which the water was caused to flow through perforated plates, emerging in streams of small diameter, and exposing so large a surface per unit volume of liquid that rapid absorption of oxygen from the air was made certain. The authors stated that plant designed on this principle had been erected to purify the water supply at Mauritius and in Uganda; and the method had sufficed to change water so loaded with vegetable matter as to be almost unpotable, into drinking water of excellent quality. An account was given of the water-works at Mare-aux-Vacoas in Mauritius, and of the various improvements in the mode of purification which have been effected from time to time. The principle of aëration had also been usefully applied at Singapore by means of intermittent filtration; but the authors held that the systematic process described by them was preferable on account of its certainty and compactness. They considered that by this means it was practicable to purify tropical waters so as to obtain a satisfactory supply without excessive cost or difficulty in working.

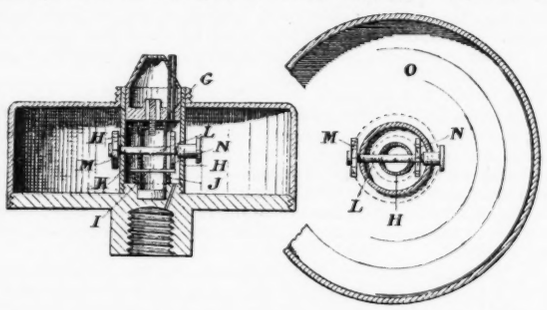
Illinois as a Coal Producer.—We have received from Mr. David Ross, the Secretary of the Bureau of Labour Statistics for the State of Illinois, the 21st annual coal report, giving a vast number of tabulated particulars for the year ending June, 1902. It appears that the first discovery of coal in the United States was made in Illinois, in 1679, by Father Hennepin, one of the early explorers of the Mississippi Valley; but no record is to be found of mining operations till 1810, when coal was worked in Jackson County. In 1833, about 6000 short tons were mined in St. Clair County; but by 1860, the output was 568,000 tons. In 1880, it was 6,089,514 tons; while in the year reported upon it was 30,021,300 tons, produced from 915 openings by 46,005 men.

REGISTER OF PATENTS.

Lighting Gas-Burners from a Distance.—Bodart, A. T., of Cologne-Bayenthal, Germany. No. 27,482; Dec. 12, 1902.

The pantentee proposes to use a rectilinearly guided valve for closing the gas-inlet to the burner, so as to secure increased reliability of the gas-igniting device, and subject the mechanism to much less wear and tear than usual.

Over the gas-supply pipe a chamber is arranged with a nozzle at its upper end; and through the wall of the nozzle a small tube extends into the interior of the chamber. The bottom of the nozzle has a central aperture which serves as a guide for the rod of the valve. The actual closing arrangement is an elastic device G on the upper surface of a rectilinearly guided vertical cylindrical body H. A pin I projects laterally from the lower part of it, and a spring J bears from below

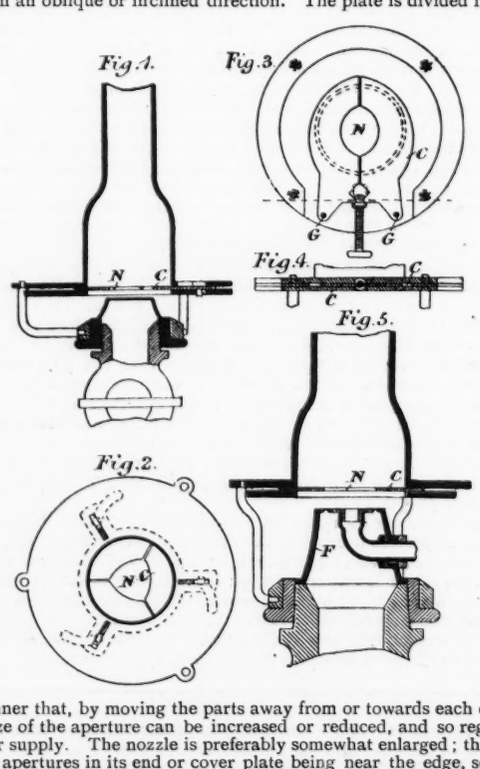


against the pin and thus tends to close the valve and the gas-inlet. The cylinder is also provided with vertical slots K through which passes a horizontal shaft L. Outside the central chamber a ratchet-wheel M is fixed to the shaft, and inside the shaft carries a step-wheel N, adapted to move the pin I and the cylinder H downwards against the pressure of the spring, and also allow the pin and cylinder to ascend under the action of the spring. The whole arrangement is surrounded by a casing containing an electro-magnet for operating the shaft L.

Regulating the Air Supply to Bunsen Burners.—Schmidt, G. J., of Zweibrücken, Bavaria. No. 7198; March 27, 1903.

This invention relates to a device for regulating the air supply to bunsen burners by means of a specially-formed plate arranged below the mixing-tube and above the nozzle, and adapted to be raised and lowered so as to more or less reduce the free aperture of the mixing-tube.

In all the forms shown, the device comprises a plate C adapted to move in guides below the mixing-tube, and provided above the nozzle with an aperture W for the ascending gas and for the air, which flows to it in an oblique or inclined direction. The plate is divided in such



a manner that, by moving the parts away from or towards each other, the size of the aperture can be increased or reduced, and so regulate the air supply. The nozzle is preferably somewhat enlarged; the gas-outlet apertures in its end or cover plate being near the edge, so that the air, which has free access, freely impinges on the jets of gas, and is carried upwards to the mixing-tube by the latter, so as to assist the mixing.

The enlargement or reduction of the mixing-tube aperture, by adjusting the divisions of the plate, can be effected in various ways. In the

form shown in figs. 1 and 2, the plate C is divided into three sections, which are radially movable and rectilinearly guided by tongues in slots in the flange of the mixing-tube. The plate divisions have pins on the under parts, which engage with eccentric slots in a rotatable disc. The rotation of the disc causes the pins and the plate sections C to move outwards or inwards.

In the form shown in figs. 3 and 4, the plate consists of two sections C rotatable about pivots G, and engaging the neck of a screw by means of noses. When the noses are moved by the rotation of the screw in one direction, the sectors are swung apart and the aperture W is enlarged; but when the screw is rotated in the reverse direction, the noses are pulled together again, and the aperture is reduced. This construction has the advantage that the screw allows of very exact and uniform adjustment of the gas and air passage.

To improve the mixture of gas and air, fresh air can be introduced at the centre of the burner-head. This can be accomplished, as shown in fig. 5, by a conduit H open at both ends and leading from the centre of the burner-head to the side, so that fresh air can always enter. Since the gas-outlet holes are arranged concentrically about the upper end of the conduit, the ascending gas-jets not only draw in and mix with air from the sides of the burner-head, but also air through the conduit H.

Fuel Compounds used in Generating Gas.—Lake, W. R.; a communication from the Fuel Manufacturing Company, of New York. No. 12,001; May 26, 1903.

The patentees' proposal is to form an "emulsion fuel composition," composed of solid carbonaceous material and water, with or without liquid hydrocarbonaceous matter—such as petroleum and other hydrocarbon oil. The ingredients are mixed and "emulsified" in various proportions to suit various uses and requirements, by grinding them together in a mill till a homogeneous emulsion is made of a consistency to be forced into heated receivers, coils, or conduits, wherein combustible gas can be generated, which may be discharged and immediately burned, or stored for subsequent use, either for heating or illuminating purposes.

The patentees do not describe or illustrate any special form of plant to carry out their invention. They, however, point out that in the manufacture of the emulsion fuel, it is important that the solid carbonaceous material—such as peat, coal, or lignite—be reduced to a finely-divided condition. Its cellular structure must be broken up and reduced to an approximate molecular condition in order to secure the best results in the production of a non-separable or undepositable emulsion, and the best results in the rapid generation of a combustible gas therefrom, in a comparatively small extent of heated receivers or conduits.

Other ingredients of a carbonaceous or hydrocarbonaceous nature will have to be added to the peat and water for making various emulsion fuel compounds. Good results are attained by combining peat, coal, and water; or peat, oil, and water; or coal, oil, and water; or peat, coal, oil, and water. The required proportions of the materials to make a gas consisting of carbon monoxide and hydrogen are: Water 58 parts, peat 37 parts, and crude petroleum 5 parts. This, it is said, will yield 50,500 cubic feet of carbon monoxide and hydrogen gas per ton of emulsion fuel. During the simultaneous process of the evolution and combustion of this gas, there will, it is claimed, be evolved 20,839,940 units of heat for useful effect—"within 5,261,060 heat units of the theoretical heat units due to a ton of anthracite coal." This ton of coal would require a storage capacity of 44 cubic feet, while a ton of the emulsion fuel in the above proportions occupies only 34 cubic feet.

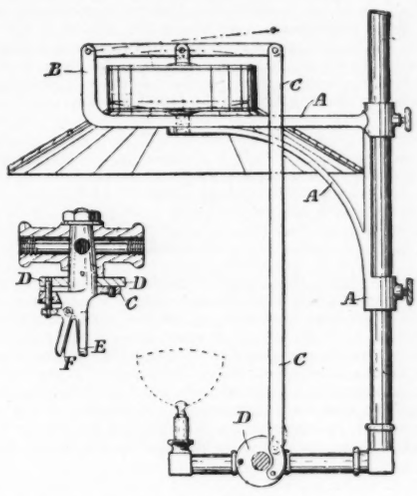
Automatically Cutting Off the Gas Supply to a Burner when Extinguished.—Haigh, S., of Vancouver, British Columbia. No. 13,525 June 17, 1903.

The object of this invention is to provide a gas-burner stopcock that will be self-closing when from any cause the gas-flame has been extinguished. The principle in the device is the contraction, when the flame is extinguished, of a volume of air expanded by the heat of the gas-flame, and the improvement lies in the means by which the movement of such contraction is applied to effect the shutting off of the gas from each particular burner, while permitting the stopcock to be operated by hand in the usual manner.

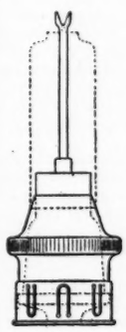
The device is shown applied to a simple wall-bracket or single pendant burner, with an enlarged detail plan of the plug cock and the connection of the cut-off mechanism.

Adjustably mounted on the vertical gas-pipe of the service to the burner is a light bracket A, which supports at a distance above the burner a cylindrical air-tight vessel having thin, flexible ends. The vessel is secured to the bracket below, while to the centre above is pivotally mounted a lever, which is fulcrumed on a pin to an extension B of the supporting bracket. The other end of the lever is connected to a rod C, the lower end of which is secured on a washer D, freely rotatable on the axis of the plug of the gas stopcock, which is placed horizontal to admit of the connection being made in the manner shown. While the gas is burning, the expansion of the air within the vessel above the flame will distend it, and operate the rod C to rotate the washer D; but as soon as the flame is extinguished from any cause, the vessel will collapse, and the connected mechanism will resume its normal position.

The washer D is normally connected to the plug (so that they rotate together) by a lock-pin slidable through a guide integral with, or secured to, the handle end of the plug, and entering a hole in the washer. The pin may be withdrawn from the washer to permit of the independent movement of the plug. When the plug is turned by the hand, the effort of seizing the portion E between the finger and thumb releases the plug from the washer by withdrawing the pin. This enables the gas to be turned on and lit without disturbing the cut-off mechanism. As soon as the gas is lit, the heat of its flame expands the air within the vessel above the burner, and the washer is rotated by the connected mechanism until the lock-pin aperture in the washer comes opposite to the lock pin which was moved round with the plug, and the spring F causes the pin to enter the pin-hole, and the two are again



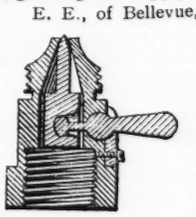
locked. If now the flame is extinguished from any cause, the air in the vessel over the flame cools and it collapses, and the washer is pulled round—taking with it the plug to the cut-off position.



Protecting Incandescent Mantles from Damage.—Naisbitt, W. J., of York. No. 26,845; Dec. 5, 1902.

This is an adjustable fitting made (as shown) to fill up the space between the bottom of the mantle and the burner. It consists of a cone or conical collar having a tapering diameter, upon which the lower edge of the mantle lightly rests, so as to prevent the mantle knocking against the burner and partially to support its weight—care being taken in adjusting it to the mantle to avoid any wedge pressure, which would damage the mantle. The collar can be raised or lowered at will, and be provided with a finger screw by which its diameter can be altered as desired, or (in the form shown) spring tongues may be formed in the collar to enable it to fit on to burners of slightly varying size.

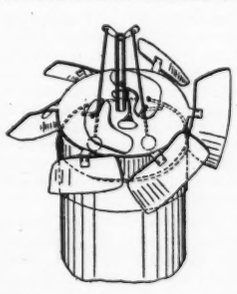
Regulating the Supply of Gas to Incandescent Burners.—Frederick, E. E., of Bellevue, Penn., U.S.A. No. 21,479; Oct. 6, 1903. Date claimed under International Convention, April 9, 1903.



This regulator of the gas supply to incandescent burners consists (as shown) in arranging at the side of the gas-nipple a lever handle actuating a needle which closes more or less the nipple admitting gas to the body of the burner. The valve can be operated, if desired, for turning down the light; and the needle may be so constructed as to afford a small passage-way for the gas when it is in closed position, thus acting as a bye-pass.

Automatic Gas-Lighting Device.—Boelen, H. J. H., of Bremen, Germany. No. 23,341; Oct. 28, 1903.

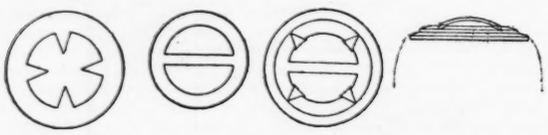
This invention belongs to the class of automatic gas-lighting devices in which a screw-wheel rotated by the ascension of the hot gases turns the lighting-pill (after the lighting) out of the reach of the flame. The device serves, at the same time—in consequence of its umbrella-like form—as a protection against dust settling on the incandescent mantle.



As shown, the metal disc fitting on the glass chimney has two openings, which remain open as long as the disc does not rotate. Over the openings the lighting-pills are so arranged that they cannot be turned out of their position by centrifugal power. Two slides, journaled on the disc and rotating on axes, have slits in which slide oscillating pendulums, which project below through slits in the disc. After the gas has been lit, the disc is at once set in rotation under the influence of the wing, whereupon the pendulums strike out and their centrifugal power closes the lighting openings through the slides as long as the rotation lasts; but when the flames become extinct, the disc ceases to rotate, and the falling pendulums draw back the slides into their original position.

Incandescent Mantle Head.—Wasmuth, A., of Hamburg. No. 16,448; July 25, 1903.

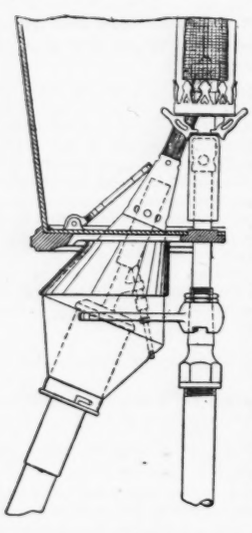
In substitution for the usual asbestos thread by which the mantle is held on the fork of an incandescent burner, the patentee proposes to employ a metal head-piece, over which the mantle is placed before burning off. This head-piece is formed of two circular pieces of thin sheet metal cut in the shape shown. The second piece is placed over the first (which is slightly coned), and the four teeth bent over so as to form the head to the mantle as in the fourth sketch.



The patentee claims that, apart from the time taken up and the increased expense resulting from the necessity of hand-labour in the production of the asbestos loop form of holder, many disadvantages are associated with it—in particular a want of uniformity in the top, so that when the mantle is exposed to vibrations, as well as when ignition is effected, cracks often appear below the top, and in use the upper part of the mantle becomes pointed, whereby both the incandescence surface and the lighting effect are diminished. The sides of the mantle too easily crack, and, in consequence, the chimney frequently bursts. All these disadvantages are said to be obviated by the holder described.

Lighting Street Incandescent Gas-Lamps.—Funcke, W., of Nieder-Ingelheim, Germany. No. 22,994; Oct. 23, 1903.

This invention of means for lighting street-lamps furnished with incandescent mantles, consists in providing a rod, upon the upper end of which is mounted a lamp adapted to emit a high temperature flame. Around the lamp is a conical-shaped casing provided with an open nozzle through which the flame passes; while the under portion of the street-lamp has connected to it a funnel-shaped mouthpiece, the upper portion of which is arranged to be normally closed by a hinged flap.



On the torch being inserted into the funnel-shaped mouthpiece (as illustrated), the flame, notwithstanding its length, passes underneath and between the chimney glass, and beneath and through the chimney gallery to the mantle, and causes it to become incandescent before (or simultaneously with) the opening of the gas supply by means of the movable horizontal lever attached to the gas-governing tap or cock. This absolutely prevents any possibility of explosion occurring—to the detriment or destruction of the mantle. Owing to the pointed ignition flame of the lamp used (of the blow pipe or soldering type) not being readily extinguishable by wind, a storm caul is not essential.

Sale of Shares.—At a recent sale by Messrs. Cunnah and Roberts, £200 of ordinary stock of the Chester Gas Company realized £230, and £200 of 3½ per cent. preference stock £191 10s.

Manchester Gas Workers' Wages.—It is stated that Alderman Gibson, the Chairman of the Manchester Corporation Gas Committee, has received from the Gas Workers' Union a request that his Committee should increase the wages of the men throughout the employ of the department by 5 per cent. on their present rate of payment. The reason urged for the application is that the profits of the gas undertaking are so great that, under existing circumstances, the workers are not paid their fair share of them. The subject probably will be discussed at the next meeting of the Committee.

Teignmouth Water Supply.—After considering and dropping a good many schemes for providing a much-needed additional supply of water, the Teignmouth District Council have entered into negotiations with the neighbouring district of Dawlish, with the object of obtaining water from the stream which supplies that town. It is contended that there is in this stream an abundant supply for both places, and that much is now running to waste which in a dry season would be invaluable to Teignmouth. The Dawlish Council have decided to receive a deputation from Teignmouth on the subject; but whether the negotiations will lead to a more satisfactory result than the many others which the Teignmouth Council have opened, remains to be seen.

New Joint-Stock Companies.—The Rhayader Gaslight Company, Limited, has been registered with a capital of £5000, in £5 shares, to acquire the business of a gas manufacturer carried on by W. H. Morgan at the Gas-Works, Rhayader, Radnorshire, and to continue the same and the business of merchants and dealers in coal, gas coke, residual and other allied products, &c. There will be no initial public issue. The Economic Stove Company, Limited, has been registered with a capital of £25,000, in £1 shares, to adopt an agreement with Mr. A. Pettengill for the acquisition of certain inventions, and to carry on the business of manufacturers of, and dealers in, stoves, ranges, lamps, and apparatus of all kinds for heating, cooking, lighting, or ventilating by gas, electricity, or otherwise. There will be no initial public issue.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Position of the Gas Industry in America—Coal Gas, Water Gas, Oil Supply, &c.

SIR,—I have read with interest an "Editorial" in the "JOURNAL" for Dec. 1, printed under the caption, "Signs of Change in America." I think your information on one or two points has been misleading; and I desire, with respect, to state a few facts as they occur to me.

Mr. Charles Carpenter appears to have said that, in the opinion of men who have had opportunity of making independent inquiry, coal gas will have the more prominent part in immediate gas-works extensions in America. If your readers understand this to mean that there is any diminution in the demand for water-gas apparatus, it will interest them to know that the Company with which I am connected has this year contracted to erect water-gas apparatus having a daily capacity of 62,700,000 cubic feet—some of the contracts having been closed at a very recent date. The total capacity of this year's contracts is greater than that of any other year, and quite 90 per cent. greater than that of any other year except the year 1898. The recent inquiries for apparatus for future erection are as numerous and important as is usual at this season. Inasmuch as I am unable to find any evidence that Mr. Carpenter is correct in his statement, as I understand it, it is unprofitable for me to discuss the cause of the condition which Mr. Carpenter asserts exists.

Mr. John West—whom I had the pleasure of meeting when he was in America—is stated by you to confirm Mr. Carpenter's remarks. Referring to its influence on gas making, he has told you that there is talk in America of the diminishing supply and stock of oil, and of a profitable and important new outlet for oil, and of the prospect of oil becoming dearer in this country. Whatever the future may hold in store, there is nothing at present to indicate that what Mr. West says he has observed is having any effect on the demand for water-gas apparatus, or is influencing gas companies to install coal-gas plants. No man knows what the oil market of the future will be. We do, however, know some things with reference to the present of which Mr. West is ignorant, or, knowing, neglects. Mr. West is mistaken in inferring that the use of oil for motor purposes has any tendency to advance the price of the grade of oil used for gas-making purposes. It is known to you, of course, that it is only the very light distillates that are used for motor purposes, and that these distillates have for many years been too high-priced for use in the manufacture of water gas.

It is true that the stocks of high-grade paraffin-base oils are diminishing. These oils are not used in the crude state in the manufacture of gas to any appreciable extent in the United States. None of the works with which I am connected, or of which I have detailed knowledge, are using such paraffin-base crude oils in the manufacture of gas. Your "Editorial" is, I understand, intended to refer only to the crude oils or distillates generally used in the United States for gas making. Crude oils produced in Kansas, Indian Territory, Texas, and California, and the distillates produced from such oils, are extensively used in gas making. They are classed as asphalt-base oils.

Within the past year, the daily production of oils with an asphalt base has increased very largely, and extensive additions have been made to the developed territory. The fluctuations in prices have been marked. The Texas oil of the Beaumont field, which was sold on May 1 at 80 c. a barrel, has since been down to 30 c. a barrel, and is now up again to 60 c. a barrel at the wells. In the Sour Lake field, the price in June was 63 c. a barrel. It has since been down to 20 c. a barrel, and is now 50 c. a barrel. Fair grades of California oils are now selling at 70 c., and poor grades at 15 c. a barrel, at the wells.

The percentage yield of the so-called "gas oil" distilled from the crude asphalt-base oils is greater than is the yield from the paraffin oils; so that while the production of the crude paraffin oils is decreasing, and, consequently, the gas oil from this source is decreasing, the deficiency is more than made up by the increased production of the asphalt-base oils and their distillates suitable for gas making.

These statements are based on authority that I think cannot be questioned; and I hope that the statement of them will persuade Mr. Charles Carpenter and Mr. John West that the outlook for water gas in the United States is not as unpromising as they have been led to believe.

Mr. West naturally heard a good deal of talk on coal-gas apparatus in the United States. Quite naturally, he was in the way to hear talk of coal gas rather than of water gas; and the bent of his mind appeared to be somewhat toward coal gas. Had these conditions been different, he might have learned that the fear of an oil famine, which appears to have affected him, was not creating a prejudice against water gas in the minds of American gas managers.

WALTON CLARK.

Philadelphia, Dec. 15, 1903.

SIR,—It appears from your columns that Mr. West has returned to England with the idea that water gas is rapidly becoming a thing of the past in America. It may interest you to know that the Company in this city has just completed a plant having a daily capacity of 10 million cubic feet of water gas. A little over a year ago, the New Amsterdam Gas Company, of New York, completed a plant having a daily capacity of 15 million cubic feet of water gas; and this year, the Mutual Gaslight Company of New York completed a water-gas plant of 6 millions daily capacity.

As far as I know, these are the only very large installations of gas-making machinery that have been recently made in this country; and as you will note, all of them are water gas.

ALTEN S. MILLER, Manager.

Consolidated Gas Company, Baltimore, Md., Dec. 21, 1903.

MISCELLANEOUS NEWS.

GUERNSEY GASLIGHT COMPANY.

Inauguration of a New Gasholder at Bouet.

The increasing consumption of gas, which, strangely enough, is noticed more in the summer than in the winter months, and the fact that the previous gasholder storage was found insufficient, has induced the Guernsey Gas Company to erect a new holder.

Some few months ago, the Company invited, in open competition, designs and estimates for a holder and steel tank of ½ million cubic feet capacity. Out of the several designs submitted, that of Messrs. Samuel Cutler and Sons, of Millwall, was selected; and the contract was accordingly placed with the firm. The work was formally inaugurated on Dec. 15, in the presence of the Chairman and Directors of the Company. Those present included: The Chairman (Mr. W. Carey), his colleagues Messrs. W. de P. Crousaz, J. B. Collings, G. T. Derrick, R. W. Dorey, and E. Valpied, the Engineer and Manager (Mr. T. Crossley), the Assistant-Engineer (Mr. F. H. Arnold), and Mr. S. Cutler, jun., of Messrs. Cutler and Sons.

The gasholder is contained in a steel tank, 104 ft. diameter by 26 ft. deep resting on foundations laid at ground-level. It has three lifts (the outer one being 102 feet diameter), and will have a delivering capacity of 555,000 cubic feet. The guide-framing is on Messrs. Cutler's patented system, and consists of eighteen verticals, with their corresponding sets of diagonals, 108 in number. A feature of this system of gasholder guide-framing is that the stiffness of the guide-framing cylinder, due to the girder-like struts and the tier of box-girders at the top, admits of the standards or uprights being constructed much lighter than usual, so that the whole structure is uniformly strong, with no redundancy of material in any of the parts. The steel construction rising over 100 feet from the ground-level, with its light lattice work superstructure, forms quite a pleasing additional landmark to the island of Guernsey.

NEW GAS-WORKS FOR FALKIRK.

Report by the Engineer.

The following report by the Engineer (Mr. W. M'Crae) upon the proposed new gas-works for Falkirk was submitted by the Gas-Works Committee to the Town Council at their meeting last month.

As instructed by you on Nov. 30 to report as to your proposed new works, I beg to lay before you the following particulars: The maximum daily consumption of gas at present amounts to about 800,000 cubic feet; and this, as no doubt you are aware, is when the town is being supplied with light pressure. I think it would be reasonable, therefore (as I have already reported), to assume that, provided all our consumers had an abundant supply, the daily consumption would be increased to about 1,000,000 cubic feet. Bearing these details in mind, I think that the new works should be constructed in sections, and that the first of these should be an entire works equal to produce 1,500,000 cubic feet per day. Should the annual increase of (say) even 7½ per cent. be maintained, works of the above-mentioned size would be fully taxed in about six or seven years from the present time.

Among the many points to be considered when about to commence the erection of the new gas-works, whereby the very best results may be obtained, and where the cost of producing the gas may be reduced to the lowest point, I consider that the retorts or carbonizing plant deserve the first and most careful consideration. There are four different systems now in operation; and to these I would beg to draw your attention: (1) Horizontal retorts, which are charged and drawn by power charging and power drawing machines, one man on each machine. These machines can be had driven either by water pressure or compressed air. (2) Horizontal retorts manipulated as above, but with an air-driven combined power charging and drawing machine, which is wrought by only one man. This is the very latest machinery made in Britain; but up till now it has only been set to work in one gas-works—Ipswich—though a number of orders are at present being executed. (3) Horizontal retorts manipulated as above; but the machinery is known as the manual charging and drawing machines, requiring one man on each machine. (4) Inclined retorts, or retorts set at an angle of 32°. The charging of these retorts is done by the force of gravity; very little machinery and few men being required to work them. This latter system is largely used in England, and is also entirely adopted in the new Granton Gas-Works in Edinburgh, as well as on a small scale at Aberdeen. Now, in a works of such size as I suggest you should erect, the first-mentioned power charging and drawing machines could not be profitably and economically used, as they are much too powerful for our wants; and therefore we could not work them up to their best paying efficiency. The manual charging and drawing machines give good results, and I think should be examined. The systems which I think are really most suitable for your works are either inclined retorts or horizontal retorts with combined charging and drawing machinery. From the particulars which I have obtained from both Edinburgh and Aberdeen, the inclined system has given very good results. Though it is my opinion that either the inclined retorts or horizontal retorts with combined charging and drawing machinery would be the most suitable for your works, still I think that it would be well that you should see all the systems that I have described, and for that purpose would recommend you to visit the Tradeston Gas-Works at Glasgow, Greenock, Perth, and the Granton Gas-Works at Edinburgh.

Regarding the other parts of the apparatus, there is nothing special to advise at present, with the exception of the present scrubber-washer and Bleachfield gasholder. The scrubber-washer was only erected a few years ago, and is a good form of machine for the extraction of ammonia and other impurities. It works very well; and I would suggest that it should be removed to the new works, and, when being erected, its capacity (which at present is 1,000,000 cubic feet per day) should be increased to 1,500,000 cubic feet per day. Removing, re-erecting, and increasing the capacity of the machine would cost £420.

Though the Bleachfield gasholder is built to contain 500,000 cubic feet, I do not think that it is safe to inflate it (as it is at present guided by wire ropes) to any more than 350,000 to 400,000 cubic feet; also the present main between the gas-works and the holder, which is 10 inches diameter, is quite unfit either to convey the gas as it is manufactured to this holder or to re-convey the gas from the holder to the governors at the works in such quantity as during the lighting season to supply the town even during the evening hours—viz., from (say) the time of the public works closing at 5.30 till about 10 p.m. When a part of the lower or heavier lift of the gasholder is available, it does assist in the supply of the town during these hours; but when only the upper or light lift is available, it is quite impossible, with the present main, to draw a sufficient quantity of gas from the holder to supply the town. This, therefore, shows that, with the present arrangement, out of a holder of a total capacity of (say) 400,000 cubic feet, you have only storage room for about 150,000 cubic feet available. When the new works are built, if this holder was to be retained on its present site, a new high-pressure main would require to be laid from the new works to the holder for the filling of same; and a new outlet main, fitted with a governor, would require to be provided in order that it could supply a district of the town under all variations in the quantity of gas required. Further, to do this would require a man to be in attendance almost continually, at least during the winter months. This, you see, would be a very costly, and, at the same time, I think, a most unworkable arrangement. I would therefore suggest for your favourable consideration the advisability of removing the gasholder and tank to the new works, re-erecting it there—adding to it a third lift (the tank being already made for this), and fitting the three lifts with steel guide-framing instead of wire ropes. By doing this, you would have a gasholder of an available storage capacity of almost 750,000 cubic feet. This work could be carried out in about six months' time. Should you not see your way to adopt this proposal, then the first section of the new works must include a tank and holder of a capacity of (say) 1,000,000 cubic feet; provision being made for its subsequent enlargement to 1,500,000 cubic feet.

The estimated cost of the three systems Mr. M'Crae states as follows: If the gasholder were to remain on the present site, the cost of new mains, outlet-pipe, and governor would be about £5640, or taking the mains another way, £3592. Removing to, and erecting and enlarging, the gasholder on new site, £6500. Providing entirely new holder, and utilizing the Bleachfield holder on its present site, £15,300, *plus* cost of mains to Bleachfield holder, £5640 or £3592, according to the route chosen—making either £20,940 or £18,892.

Mr. M'Crae concludes: I would advise you to proceed with the work as quickly as possible, as, even provided all the work proceeds without serious interruption, the gas-works cannot possibly be in operation before the late autumn of 1905. I have not touched on the question of the cost of the new works, as until the plans are completed (at least to a large extent), any estimate would be very approximate, and, I fear, more misleading than helpful.

After a short discussion, the minutes of the Gas Committee containing the report were unanimously agreed to.

WELCOME HOME OF THE WILLEY COMMISSION.

It was mentioned in the "JOURNAL" last week that the Mayor and Mayoress of Exeter (Mr. and Mrs. Widgery) had invited a number of representative citizens and others to meet the members of the Commission who were sent by Mr. H. A. Willey to America to investigate the condition of industry in that country, and who have recently returned. The gathering took place on the 28th ult.; and among those present were Mr. and Mrs. Willey and Mr. S. J. A. Willey. After the reception by the Mayor and Mayoress, a capital programme of vocal and instrumental music was carried out. The Mayor extended a cordial welcome to the members of the Commission; remarking that he did it solely on the ground of citizenship, and in no sense from a party point of view, and because the subject they had been abroad to study was one which interested the whole of the country. Mr. H. A. Willey said he should like to publicly express his feelings of gratitude and thankfulness to Providence for the care which had been exercised over the members of the Commission in accomplishing a long and arduous journey by sea and land, and bringing them home safely. He was deeply indebted to the Mayor for the kindly thought which suggested his reception of the Commission. They had been elected as delegates representing far wider interests than the domestic interests of his firm; they were representatives of a condition of things that applied to all the industries of this country. He himself went to the United States, and there observed some very remarkable features which he thought might be confirmed by his sending, on his return, the gentlemen who formed the Commission, and in whom he had every reason to feel the utmost confidence that they would, from a practical point of view, survey and observe the industrial occupations of the States, and in a measure ascertain what conditions there were that prevailed across the Atlantic which enabled the Americans to prosecute those industries with an alleged greater success than we did in England. They would study the problems to which he had given during the last few years a considerable amount of time and sympathetic consideration—problems which concerned primarily the welfare of the working and artisan classes. He was sure the intercourse which had taken place between the workmen and their American cousins had, to some extent, opened the door to friendly interest and sentiment between them—to a kindly feeling which, however small in degree, must have a considerable effect upon the relations between the United States and this country.

Mr. R. J. Rew, one of the delegates, read a paper on his experiences,

The Commission made many inquiries as to Protection, and found the Americans marvelled that England had stuck to Free Trade so long. Mr. T. Langmead, the representative of the Trade and Labour Council, also read a paper. The impression he formed was that if there was a better understanding brought about between employer and employed, we need not fear foreign competition. Mr. W. Amery, representing Friendly Societies, gave the results of his inquiries among those of America. He said the members of the American Societies interested themselves much more in the welfare of their members than did those in England. Mr. H. W. Loram spoke of the educational side of the delegates' tour. He was absolutely convinced that if England was to maintain her commercial position she must adopt an extensive system of manual schools. The Mayor heartily thanked the delegates for their addresses, and also expressed his deep appreciation of the public spirit which had animated Mr. Willey in sending out the Commission.

Mr. Willey briefly acknowledged the compliment paid to him. The Bishop of Marlborough said they owed Mr. Willey a far wider debt than Exeter could pay for what he had done. There was nothing more injurious than narrow principles, and there was nothing which would widen those principles better than travel. He should very much like to see the working men of England brought into closer contact with the commercial relations of other nations. On behalf of the guests, he proposed a vote of thanks to the Mayor for his hospitality, and it was carried by acclamation.

ACCIDENTS FROM GAS ESCAPES.

A Fatal Case at Bristol.

A sad accident, which in one instance unhappily proved fatal, occurred at Bristol just at the close of last year. On Friday morning, a man named Beese failed to put in an appearance at his work; and on his house being found shut up, the police were communicated with. When an entry was forced, the place was found to be filled with gas; and the man, his wife, two daughters, a son, and a grand-daughter were all found lying in bed apparently lifeless. The elder of the two daughters was dead; but with regard to the others, prompt measures were taken, and by the evening they were all reported to be out of danger. There is no gas laid on in the house, so that the accident must have been the result of leakage outside. The surviving members of the family in all probability owe their lives to the trifling fact that the son, waking about midnight with a bad headache, opened the window in order to obtain fresh air and listen to the New Year bells. Fortunately, when returning to bed he left the window open, and thus lessened the effect of the gas which found its way into the house later in the night.

A somewhat similar accident is reported from Glasgow, where, on the same morning, a man named Scoular awoke and discovered that his house was full of gas, and his wife and six daughters were unconscious. Having procured assistance, and conveyed his family into the open air, Scoular proceeded to break down his neighbour's door, and found him and his four children also lying unconscious. None of the sufferers in this case seems to have been very seriously injured by the accident, which was caused by a broken gas-main.

FATAL ACCIDENT TO A GAS LABOURER.

An accident of a peculiarly distressing character, but greatly exaggerated in the reports first circulated, occurred in Mill Road, Cambridge, on Wednesday morning. A number of workmen employed by the Cambridge Gas Company were engaged in digging trenches for the purpose of replacing a gas-main. While three of them—named Porter, Matthews, and Markham—were excavating the earth, a mass of the roadway fell upon them; burying Porter under it from the chest downwards. Other workmen ran quickly to the spot to render assistance; but twenty minutes elapsed before the unfortunate man could be released. The accident occurred opposite the premises of the Romsey Town Cement and Lime Company, and to these he was removed. A medical man, who was on his round of visits, was promptly in attendance; but unhappily he could only pronounce life to be extinct. Matthews received a few bruises and abrasions, and Markham had three of his fingers crushed; but their injuries were not very serious. An inquiry into the matter was held on Friday by Mr. H. Saunders French, the Borough Coroner; Mr. A. E. King (the Secretary) and Mr. J. W. Auchterlonie (the Engineer and Manager) being in attendance on behalf of the Company. The first evidence given showed that the deceased was undermining the side of the trench, which was 3 ft. 4 in. deep and 2 ft. 3 in. wide, when about 27 yards of ground fell, and buried him. His body generally was bruised, and three of his ribs, in the region of the heart, were fractured. The pelvis was broken and the bladder torn; and the medical opinion expressed was that he died from shock consequent upon these injuries. The first reports of the occurrence said that gas from a main was accidentally fired, and that "a dense mass of flames instantly poured over the imprisoned man, who was literally roasted alive in the sight of the horrified spectators." But the doctor stated that there was no mark of burning about the body or the clothing of the deceased. Matthews, one of the injured men, said the trench in which Porter met his death was not shored up, and he considered it should have been. He thought the fall of the ground was due to the frost, assisted by the undermining. He saw lighted gas, probably caused by a workman striking a stone and creating a spark which fired it as it escaped; but the flames were 3 feet from deceased. Two labourers deposed that, in their opinion, the conditions under which they were working were not dangerous. Charles Henry Hirst, the foreman of the gang, said he had had 15 years' experience in excavating. He went over the whole of the workings only five minutes before the accident happened, and all was then safe. The undermining was done only in order to find the old pipes, so that he should know how much more of the road to open. It was a hard road, and he wanted to break up only what was necessary. Some 81 feet in all of earth fell in. The undermining was 10 inches in extent. This statement was contradicted by two of the Jury, who said they had been over the ground, and found that in some places it was 18 inches. In answer to Mr. King, witness said he had not had any complaints about the excavation being unsafe. The Jury returned a verdict of "Accidental death;" adding a rider to the effect that there had been an error on the part of the foreman in not shoring up the trench, and suggesting that in future, under similar circumstances, the trenches should be shored. Mr. King acknowledged the verdict and remarks, and expressed the sympathy of the Directors of the Company with the widow and family of the deceased.

MANCHESTER CORPORATION GAS SUPPLY.

Work of the Past Year.

According to a review of the past year's work of the Manchester Corporation Gas Department, which appeared in a local paper on Thursday, the chief features have been the bringing of the manufacturing processes up to the greatest efficiency, with the object of concentrating power, reducing cost, and distributing gas of satisfactory quality for public and private consumption. On the 10th of July, an inquiry was held on behalf of the Local Government Board for sanction to borrow £253,000 for gas-works purposes. This sum exhausted the then borrowing powers of the Gas Committee. There was no opposition, and sanction was readily granted. It was shown at the inquiry that the money would be spent as follows: Converting one-half of No. 2 retort house at the Gaythorn station to the inclined-retort system, with the necessary covering of the River Medlock, £43,200; extension of railway sidings, £4000—£47,200. At the Rochdale Road station, an exhauster-house and exhausters, £6500; condensing plant, £1500; boiler house and boilers, £7350; workmen's dining-room, £1500—total, £16,850. At the Bradford Road station, an extension of the railway sidings, which accommodate about 115 waggons, to provide for 200 waggons, £11,417; low-level railway, £2000; hydraulic waggon-lift, £1800; store-sheds, workmen's dining-room, and other buildings, £2000; coal-bunkers, £5000; additional new purifiers, &c., £27,120—total, £49,337. In the distributing department, new mains, £25,550; new services for three years, based on five years' average, £24,000; new meters, do., £48,000; new stoves, do., £42,633—total, £140,183. A considerable portion of this money had already been expended. Contracts for other work have been entered into, and plans and specifications to complete the scheme are in course of preparation by the Chief Engineer (Mr. J. G. Newbigging). It is reasonably expected that during the present year much of the work will have been done. With regard to consumption, the effect of the abolition of the charge for the use and fixing of gas-cookers is looked upon with much interest. It is too early to judge of the ultimate results of the new arrangements; but the first quarter's operations have been encouraging. In consequence of the greater number of orders given out, a considerable reduction has been obtained in the price of the cookers; and their extended use has produced a large increase in the consumption of gas. It has been found, after careful examination, that in the cases of a number of consumers who had no cookers in the September quarter of 1902, but had them fully in use in the last September quarter of 1903, the consumption of gas has increased within the city from 563,400 to 928,000 cubic feet, and beyond the city from 255,400 to 460,200 cubic feet; showing an increase of 64·73 per cent. and of 80·19 per cent. respectively. The number of cookers in use in the whole district of supply at the end of September, 1902, at which date the business was at a standstill, and there was a large dead stock, was 12,299; at the end of September, 1903, the number was 15,146—showing an increase in the year of 2847, largely owing to the recent abolition of charges for hire and fixing. This new departure was looked upon with some anxiety, as it was feared that the inexperience of the users of cookers might result in heavy gas bills, and consequently plenty of grumbling. This fear has proved to be groundless, as the complaints so far this year as to the amounts of the gas bills have been less than usual. In addition to the abolition of stove hire, the year has been marked by a reduction of 3d. per 1000 cubic feet in the price of gas; the present charges being 2s. 6d. within and 2s. 9d. beyond the city. All things considered, the finances of the Gas Department are stated to have never been in a sounder condition than they are at present. The last balance-sheet disclosed assets, consisting of land, buildings, apparatus, and floating debts and stocks, amounting to £2,683,897 5s. 11d., against the total liabilities, including secured and other debts, of £1,327,666 1s.

Sheffield Water Supply.—In the course of a review of the progress of the water-works of the Sheffield Corporation in the past year which appeared in a local paper on Wednesday, the following figures showing the position of the supply were given: There are altogether ten completed reservoirs, and they contain, when full, 3,687,500,000 gallons. The total drainage area is 15,703 acres. The total available water per day during three consecutive dry years is 17,524,547 gallons, of which an average of more than one-half has to be sent down the streams as compensation water; leaving for the supply of the city and district 8,465,173 gallons. The works in the Little Don Valley will add for Sheffield 3,180,821 gallons; from the Ewden Valley watershed there are obtained 4,624,627 gallons; and the Corporation's share of the Derwent Valley scheme is estimated at 6,000,000 gallons—making a grand total of 22,270,621 gallons. This quantity is sufficient to supply a population of about 750,000.

GAS AND ELECTRICITY SUPPLY AT NICE.

Water Gas Sanctioned.

The last number to hand of the "Journal de l'Eclairage au Gaz" contains the text of a new contract lately entered into by the Municipality of Nice with the Gas and Electricity Company, whereby the conditions under which these illuminants are supplied have been considerably modified. The Company have been working under a Treaty dated Jan. 23, 1880, granted for a period of 33 years, in regard to the supply of gas, and under a second, dated June 6, 1903, and expiring on Dec. 31, 1913, in respect of electricity. By the terms of the new contract, the Company's monopoly is prolonged for 30 years from Jan. 1, 1914, and will consequently hold good till Jan. 1, 1944. They undertake, whenever called upon to do so by the Municipality, to extend the supply of gas into new districts—for public lighting when lamp-pillars have been put up at an average distance of 55 yards apart, and for private lighting when the revenue from this source and from the street-lamps shall amount annually to 20 per cent. of the expenditure incurred. The Company have been authorized to make carburetted water gas, and to mix it with ordinary coal gas to the extent of 50 per cent., provided that the resulting mixture has the same illuminating power and is of the purity specified in the Treaty, and, moreover, can be employed without danger to the public. If the use of this gas leads to economy in the cost of production, the consumers and the Municipality are to participate therein to the extent of one-half. The Committee of the Municipal Council who had the new contract under consideration explained in their report that they had sanctioned the use of water gas because the Technical Commissions who had investigated the matter in Paris and Marseilles had expressed a favourable opinion upon it; and, moreover, it was in use in most of the large English works, as well as in those of the Brussels Municipality and the Lyons Gas Company. At the request of the Municipal Council, the public lamps are to be altered to the incandescent gas or some other improved system at the rate of 500 per half year. The Auer burners are to be of two kinds—one consuming 3·5 cubic feet, and the other 2·6 cubic feet per hour. The former are to take the place of those now consuming 5·3 cubic feet, while the latter will replace those burning 3·5 cubic feet. The cost of these changes will be borne by the Company and the Municipality in equal proportions. The Company will maintain the new burners; but they will be paid 10 frs. each per annum for their trouble. The price of gas for public lighting is to be 7·5 c. per cubic metre (1s. 8d. per 1000 cubic feet) up to Dec. 31, 1913, and 6 c. (1s. 4½d.) till the end of the concession. Electricity for the same purpose is to be charged at the rate of 4 c. (0·4d.) per hectowatt. To private consumers the charge for gas is to be 20 c. per cubic metre (4s. 6d. per 1000 cubic feet) up to Dec. 31, 1913, and 18 c. (4s. 1d.) afterwards. For heating and industrial purposes, the prices are 17 c. (3s. 10d.) for the next ten years, and 16 c. (3s. 7¾d.) subsequently. Electric current for lighting is to be charged at the rate of 8 c. per hectowatt-hour, to be reduced to 7 c.; and for heating and industrial purposes, a maximum of 5½ c. Provision is made for a reduction in the price of current under conditions specified. In the event of improvements in manufacture being introduced and kept in use for two years in any town of the size of Nice, and resulting in substantial economy in the production of gas or electricity, the Municipality reserve the right to demand their adoption by the Company, and to share the benefits with the consumers to the extent of 50 per cent. for gas, and 75 per cent. for electricity.

THE DUBLIN ELECTRIC LIGHTING MUDDLE.

£52,000 More Required.

A Special Meeting of the Dublin Corporation was held on the 18th ult., for the purpose of considering, among other matters, reports of the Electric Lighting Committee and Mr. Robert Hammond in reference to the application of the Corporation to the Local Government Board for their sanction to further loans of £48,000 to cover the extra expenditure on the electric lighting scheme, £28,000 to carry out an extension of electric lighting in Clontarf, and £8238 for wood paving, asphalt, and concrete works. The LORD MAYOR presided.

The Electric Lighting Committee reported that they had received a letter from the Local Government Board to the effect that they had addressed to the Town Clerk a letter on the subject of the application, a copy of which was enclosed. It began by stating that the Board had had before them the report of Mr. Cowan, their Chief Engineering Inspector, on the inquiry lately held by him (*ante*, p. 164), in which it was shown that £41,500 of the £48,000 applied for represented an under-estimate of the cost of the electric lighting scheme (on which liabilities to the amount of £254,500 had already been incurred), notwithstanding the fact that a saving of about £6000 had been effected by the adoption of a cheaper method of generating electricity than that provided in the estimate. In addition to the £41,500, a further sum of at least £4300 would be required for extra works. It appeared to the Board that about 87 per cent. of the additional cost for which the new loan was required was due to expenditure which did not "increase the earning capacity of the system." This they considered a remarkable and unfortunate result, especially in view of the fact that at the inquiry in 1899 assurances of a definite kind were given by the Engineer and on behalf of the Lighting Committee, that the amount then applied for would be sufficient for the completion of the scheme. In the detailed statement showing how the sum of £48,000 was arrived at, provision was made for sums of (1) 1000 guineas, the payment to Mr. Hammond for supervision, during a period of twelve months of the

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 28.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 15	10½	Alliance & Dublin 10 p.c.	18½—19½	..	5 7
100,000	10	,,	7½	Do. 7 p.c.	12½—13½	..	5 11 1
200,000	5	Nov. 12	6½	Bombay, Ltd. . . .	5½—6	..	5 8 4
140,000	5	,,	6½	Do. New, £4 paid	4—4½	..	5 15 7
380,000	Stk.	Aug. 13	12	Brentford Consolidated	228—233	..	5 3 0
300,000	,,	,,	9	Do. New . . .	171—176	..	5 2 3
50,000	,,	,,	5	Do. 5 p.c. Pret. .	130—135	..	3 14 1
206,250	,,	Dec. 11	4	Do. 4 p.c. Deb. .	103—108	..	3 14 1
220,000	Stk.	Sept. 11	10½	Brighton & Hove Orig.	207—212	..	5 1 5
246,320	,,	,,	7½	Do. A. Ord. Stk. .	145—150	..	5 3 4
460,000	20	Oct. 15	10	British.	38½—39½	..	5 1 3
100,000	Stk.	Aug. 13	6	Bromley, Ord. 5 p.c. .	115—120	..	5 0 0
165,700	,,	,,	4½	Do. do. 3½ p.c. .	88—93	..	4 16 9
500,000	10	Oct. 15	7	Buenos Ayres (New) Ltd.	10¼—10⅝	..	6 10 3
250,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	91—93*	..	4 6 0
150,000	20	July 10	8½	Cagliari, Ltd. . . .	22—24	..	6 17 6
100,000	10	June 11	10	Cape Town & Dis., Ltd.	14—15	..	6 13 4
50,000	50	Nov. 3	6	Do. 6 p.c. 1st Mort.	52—54	..	5 11 1
1,375,000	Stk.	Aug. 27	5⅝	Commercial 4 p.c. Stk.	104—107	..	4 17 3
503,750	,,	,,	5	Do. 3½ p.c. do.	97—100	..	5 0 0
442,947	,,	Dec. 11	3	Do. 3 p.c. Deb. do.	84—87	..	3 9 0
800,000	Stk.	Dec. 30	7	Continental Union, Ltd.	115—120*	..	5 16 8
200,000	,,	,,	7	Do. 7 p.c. Pref.	128—133*	+1½	5 5 3
575,000	Stk.	Aug. 27	5⅛	Crystal Palace Ord. 5 p.c.	110—115	..	4 12 9
60,000	,,	,,	5	Do. 5 p.c. Pref. .	118—123	..	4 1 4
112,533	,,	July 10	5	Do. 5 p.c. Deb. Stk.	135—138	..	3 12 6
486,090	10	July 29	10½	European, Ltd. . . .	18½—19½	..	5 7 8
354,060	10	,,	10⅜	Do. £7 10s. paid	13—14	..	5 12 6
15,243,200	Stk.	Aug. 13	4⅛	Gas-light and Coke Ord. . .	89—91	+2	4 16 8
2,600,000	,,	,,	3⅜	4 p.c. max. .	86—88	..	3 19 7
3,799,735	,,	,,	4	4 p.c. Con. Pref.	107—110	..	3 12 9
4,193,975	,,	Dec. 11	3	3 p.c. Con. Deb.	85—87	..	3 9 0
258,740	Stk.	Sept. 11	5	Hastings & St. L. 3½ p.c.	90—95	..	5 5 3
70,000	10	Oct. 15	11	Hongkong & China, Ltd.	16—17	..	6 9 5
3,800,000	Stk.	Nov. 12	10	Imperial Continental .	197—200	..	5 0 0
473,600	Stk.	Aug. 13	3½	Do. 3½ p.c. Deb. Red.	98—100	..	3 10 0
165,242	Stk.	Aug. 27	6	Lea Bridge Ord. 5 p.c.	113—118	..	5 1 8
561,000	Stk.	,,	10	Liverpool United A .	214—216	..	4 12 7
718,100	,,	,,	7	Do. do. B .	163—165	..	4 4 10
306,083	,,	Dec. 30	4	Do. do. Deb. Stk.	108—110*	..	3 12 9
75,000	5	Dec. 11	5	Malta & Medn., Ltd. .	4¼—4⅝	..	5 5 3
560,000	100	Oct. 1	5	Met. of Melbourne 5 p.c. Deb.	101—105	..	4 15 3
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	100—102	..	4 8 3
541,920	20	Nov. 12	3½	Monte Video, Ltd. . .	9—10	..	7 0 0
1,515,892	Stk.	Aug. 13	4½	Newc'tle & G'tesh'd Con.	105—107	..	4 4 1
376,855	Stk.	Dec. 31	3½	Do. 3½ p.c. Deb.	94—95*	..	3 13 8
300,000	Stk.	Nov. 26	8	Oriental, Ltd. . . .	135—140	..	5 14 4
600,000	5	Sept. 30	7	Ottoman, Ltd. . . .	5⅞—6⅛	..	5 7 8
205,005	Stk.	June 26	6½	Ply'mth & St'house 5 p.c	123—128	..	4 15 8
851,070	10	Oct. 15	7	River Plate Ord. . .	10¾—11¼	..	6 4 5
300,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb..	92—94*	..	4 5 1
250,000	10	Sept. 30	8	San Paulo, Ltd.. . .	10¾—11¼	..	6 19 2
135,000	Stk.	Sept. 11	10	Sheffield A	240—242	..	4 2 8
209,984	,,	,,	10	Do. B	240—242	..	4 2 8
523,498	,,	,,	10	Do. C	239—241	..	4 3 0
116,106	Stk.	Sept. 30	5	Shrewsbury Ord. 5 p.c.	109—112	..	4 9 3
6,150,000	Stk.	Aug. 13	5⅛	South Met., 4 p.c. Ord.	116—119	+1	4 9 6
1,780,000	,,	July 10	3	Do. 3 p.c. Deb. . .	86—89	..	3 7 5
380,940	Stk.	Nov. 12	5	Southampton Ord. . .	105—110	..	4 10 11
87,950	,,	July 10	4	Do. 4 p.c. Deb.	102—105	..	3 16 2
120,000	Stk.	Aug. 27	6	Tottenham and Edmonton A. 5 p.c.	115—120	..	5 0 0
313,020	,,	,,	4½	B. 3½ p.c.	95—100	..	4 10 0
182,380	10	Dec. 30	8	Tuscan, Ltd.. . . .	8—9*	+½	8 17 10
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	97—99*	+1	5 1 0
737,142	Stk.	Aug. 13	5	West Ham, 5 p.c. Ord.	94—98	..	5 2 0
				WATER COMPANIES.			
781,517	Stk.	Dec. 30	12	Chelsea, Ord. . .	300—310*	+1	3 17 5
150,000	,,	,,	5	Do. 5 p.c. Pref. .	140—145*	+2½	3 9 0
160,000	,,	,,	4½	Do. 4½ p.c. Pref. '75	130—135*	+1½	3 6 8
175,785	,,	Sept. 30	4½	Do. 4½ p.c. Deb. .	132—137	..	3 5 8
1,720,560	Stk.	Oct. 15	8	East London, Ord.. .	217—220	+1	3 12 9
654,740	,,	Dec. 11	4½	Do. 4½ p.c. Deb. .	133—138	..	3 5 3
1,282,943	,,	,,	3	Do. 3 p.c. Deb. .	87—90	..	3 6 8
700,000	50	Dec. 11	10	Grand Junction 10 p.c. max..	133—136	+1	3 13 6
310,000	Stk.	Sept. 30	4	4 p.c. Deb..	115—120	..	3 6 8
708,000	Stk.	Aug. 13	10	Kent	290—300	+7½	3 6 8
160,000	,,	,,	7	Do. New, 7 p.c. max..	105—205	+5	3 8 4
1,043,800	100	Dec. 30	11	Lambeth, 10 p.c. max..	285—295*	+3	3 14 7
406,200	100	,,	8½	Do. 7½ p.c. max..	210—220*	+2	3 17 3
350,000	Stk.	Sept. 30	4	Do. 4 p.c. Deb..	115—120	..	3 6 8
500,000	100	Aug. 13	12⅝	New River, New Shares	310—320	+5	4 0 0
1,000,000	Stk.	July 29	4	Do. 4 p.c. Deb..	115—120	..	3 6 8
902,300	Stk.	Dec. 30	7½	South-wark Ord. . . .	243—248*	+8½	3 0 6
126,500	100	,,	7½	7½ p.c. max.	195—205*	−1½	3 13 2
489,200	Stk.	,,	5	and 5 p.c. Pref. .	138—143*	..	3 9 11
1,019,585	,,	Oct. 15	4	Vauxhall 4 p.c. A Deb.	117—120	+1	3 6 8
1,155,066	Stk.	Dec. 11	10	West Middlesex. . .	290—300	+2½	3 6 8
200,000	,,	,,	4½	Do. 4½ p.c. Deb. .	130—135	..	3 6 8
200,000	,,	Sept. 11	3	Do. 3 p.c. Deb. .	88—91	..	3 5 11

* Ex div.

working of the new system; (2) £300, the cost of the preliminary running of the machinery; and (3) £250 for alteration of arc lamps, &c., belonging to customers supplied from the old works rendered necessary by a change in the periodicity of the electric current now generated. The Board did not consider that these could properly form the subject-matter of a loan, as the first and second sums were not expenditure of a capital nature, and the third appeared to be of doubtful legality. With respect to the item of £28,000, the Board would be prepared to consider the question of sanctioning a loan in this case when detailed plans, specifications, and estimates for the proposed works had been submitted. As to the £8238 required to carry out wood-paving work, &c., it appeared to the Board, from Mr. Cowan's report and the evidence of the City Engineer, that this application related to a great extent to matters which were the subject of a former application for a loan that was not sanctioned; that the works were not of an urgent nature; and that there was no good reason why they should not be gradually provided for out of the estimates. On this letter, Mr. Hammond presented a long explanatory report to the Lighting Committee, expressing his extreme pleasure to find that, in spite of the criticisms of the Local Government Board in certain directions, they were willing to sanction the loan for additional works, with the three exceptions specified—viz., £1000 for supervision, £300 for the preliminary running of the machinery, and £250 for altering the arc lamps, &c. With regard to the last of these items, he thought the Board's attention should be drawn to the fact that the Board of Trade, in drawing up regulations for the change of periodicity, made it incumbent upon the undertakers to bear the cost thereof. He noted with great satisfaction that the loan for £28,000 in respect of the Clontarf lighting had been sanctioned in full, subject to the approval of the plans, &c. After the very exhaustive inquiry conducted by Mr. Cowan, Mr. Hammond was surprised to note the observation that, out of the £48,000 applied for, £41,500 represented an under-estimate of the cost of the scheme, as he had occasion in the course of the inquiry to draw attention to so many items to which this remark could not apply. He then proceeded to deal with various other matters in the letter. The Lighting Committee, in accordance with the modification suggested by the Board, recommended that the application should be amended by the addition of £4305, particulars of which were laid before the Inspector at the inquiry, and by the omission of the amounts of the three items mentioned by the Board; the Council, however, reserving the right to make further application for the sum of £250 for the alteration of consumers' arc lamps, &c., should the revised regulations of the Board of Trade on this head satisfy the Local Government Board as to the legality of such expenditure. The Committee also recommended that a suggestion of the latter Board, that the words "or other lender, as may be desirable," should be added to their application for permission to raise the money required.

Mr. J. IRWIN, the Chairman of the Committee, moved the adoption of the report, and made a long statement in explanation of the necessity for amending the application. He said that when Mr. Hammond was preparing the list of extras, he (Mr. Irwin) impressed upon him the importance of making it so comprehensive as to obviate the necessity of having to apply for a further loan until such time as they could show financial results which would warrant the Local Government Board in sanctioning a loan for extensions. Mr. Hammond assured him that he had done so; and at his suggestion he then added a further sum for contingencies, amounting to £1870, which brought the total to the round figure of £48,000. Accordingly, the Lighting Committee approached the Council, and, replying when the assurances given them, asked them to forward the application. Upon the morning that the inquiry opened, he observed, when glancing over the detailed statement prepared by Mr. Hammond, that the £1870 had disappeared as a contingency item, and had become merged in the general accounts; and, further, that Mr. Hammond had diverted £4300 of the sum originally sanctioned by the Board for enabling the Committee to lay in house services, for the purpose of covering the cost of certain works which had been decided upon previously, and almost all of which had been actually executed at the time. He drew the Law Agent's attention to this matter, and informed him that he could not allow such a thing to pass. During the course of the inquiry, the Inspector himself discovered what was proposed to be done. In examination, Mr. Hammond admitted that it was necessary to keep the full sum of £6224 for house services intact; and he requested the Inspector to take the Corporation as wishing to have the £4300 added to the application. Mr. Hammond, in his reply to the observations of the Local Government Board, claimed that the £4300 involved in providing improved coal-handling and ash-disposal apparatus was not included in his original scheme. He (Mr. Irwin) would point out to the Council that originally Mr. Hammond provided for overhead coal-bunkers; and the Inspector reminded him at the inquiry that in the year 1900 he contemplated spending £3000 on a coal-store, and £3000 on iron coal-bunkers—£6000 in all—and to this Mr. Hammond assented. The speaker expressed his agreement with the Local Government Board that, according to Mr. Hammond's own estimates and evidence at the original inquiry, there should have been a saving of £6000 by reason of the adoption of a cheaper method of generating current. Having dealt with other matters, the speaker concluded by saying that he and his colleagues on the Committee felt very keenly the criticisms which had been passed upon them to the effect that they had been an obliging and lax Committee where Mr. Hammond and his estimates and accounts had been concerned. He stated most unhesitatingly that in no single instance did they give their sanction to an extra, as brought before them by Mr. Hammond, until they had thoroughly discussed the point with him, and were satisfied that, in the interests of the scheme itself, it was a vital necessity to do so. In the bill of extras, as laid before the Inspector, there were, no doubt, some very large items which were not submitted to the Committee, but which Mr. Hammond claimed that he was empowered to order as the work progressed, under the terms of his original appointment by the Council. To use his own words, the Council had taken him "for better or worse," and placed him in the position of

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expert adviser and arbiter as between the Corporation and the Contractors; and the Committee had supported him in every way.

Alderman DOWD seconded the motion.

Mr. R. JONES said that, in effect, the letter of the Local Government Board drew their attention to two facts—that the electric lighting scheme had been seriously under-estimated, and that the additional capital asked for would be unremunerative. Two matters of the highest importance were at issue in connection with the scheme. One was the credit of the Corporation, and the other the reputation of their Consulting Engineer. The results at which he (Mr. Jones) had arrived) after a careful study of the figures, were of a very startling character. Mr. Hammond, in his first report, had worked out, upon an expenditure of £254,500, a gross profit of £21,969, to provide for interest, sinking fund, and a margin of profit to the rates. This was calculating the cost of generation and distribution at the rate of 1·5d. per unit, and included a sum of £9000 per annum to be paid by the ratepayers for public lighting. A revision of these figures on the basis of Mr. Hammond's own calculations, and adding the additional money now asked for, would work out thus: Original capital, £254,500; applied for in addition, £48,000; still further now asked for, £4305—showing a gross total of £306,805. The gross profit at 1·5d. per unit was calculated at £21,969. But deducting the amount for the sinking fund and interest—a sum which would be about £14,231 11s. 6d.—and they had the profit brought down to £7737 8s. 6d., out of which all salaries, wages, expenses, and the margin for contingencies must be provided. All the calculations had been based on a full running working load of 2200 kilowatts and 1·5d. per unit; and so far as they were not producing the full load would their estimated profit fall below the calculations. They must add £50,000 for the old system at Fleet Street, which must be absorbed and put on the shoulders of the new one; bringing the total cost up to £306,805, instead of £254,500. The interest and sinking fund on this would amount to £16,528; but as the profit, at 2d per unit, would be only £16,459, there would be an actual loss of £69, supposing the full capacity of 2200 kilowatts was reached. This was without reckoning anything for salaries and wages; while it included a sum of £9000 to be paid annually by the citizens for public lighting, which must come out of the rates.

Mr. KELLY suggested that six or eight members of the Council should be appointed to investigate the whole subject from beginning to end; and when the Corporation had their report, they would be wiser.

Mr. BRADY supported this suggestion. In his opinion, too much confidence had been placed in Mr. Hammond.

Alderman M'Carthy said the issue was this: Was the scheme likely to succeed by getting the additional money? If they were assured that with this assistance they could make it a success, he thought there should be no difficulty about the course to adopt. He was inclined to think whether it would not be better to advertise the whole thing, and get rid of it.

The LORD MAYOR remarked that the Local Government Board criticized the scheme, and said the cost had been under-estimated; but they also said that the Corporation might increase their application by £4300. The Board had therefore impliedly sanctioned the scheme in suggesting this increase. The Local Government Board said that of the sum of £48,000 applied for, fully £41,500 had been under-estimated. In his opinion, the Board must bear some responsibility for that. Mr. Hammond still adhered to his original estimate that electricity could be produced at 1·5d. per unit. Let the Council give him to understand that they would put him in charge of the works for the next twelve months, and let him give them satisfactory results from his working, or an explanation if it were not successful. Let them not interfere with any arrangement they had made with him, and insist upon not relieving him of his responsibility.

Mr. IRWIN having made some remarks in reply, the report was adopted, with one dissentient.

NORWICH CORPORATION AND THE WATER-WORKS.

Revived Proposal to Purchase.

At the Meeting of the Norwich City Council on the 22nd ult., the subject of the acquisition by the Corporation of the undertaking of the City of Norwich Water-Works Company was under consideration. It was introduced by Mr. Louis Tillett, who remarked that, with the exception of about four large cities, Norwich was the only one which did not possess the water-works from which it was supplied; and he thought that, as the Company were going to Parliament, the present was a favourable time for negotiations. Referring to previous attempts to acquire the works, he pointed out that in 1891 negotiations were opened with the Company, but unsuccessfully. In 1897, the Corporation went so far as to offer the market value of the concern, and to give compensation to any officials they did not take over. In 1898, they made an offer of Corporation stock, sufficient to produce to the then shareholders the maximum dividend to which they were entitled. In 1900, they made a further attempt to obtain possession of the water-works; but in the result, the Company absolutely declined to negotiate. The Council then resolved to promote a Bill in Parliament; but it had to be abandoned, because at the time considerable dissatisfaction existed in the city at the management of municipal affairs. It was felt that in face of the fact that it would be essential to show to a Parliamentary Committee that the Council possessed the confidence of the citizens, it would be impossible to successfully proceed with the Bill. What had happened to cause him to bring this proposal before the Council again? There had recently been an advertisement by the Company to the effect that they were seeking parliamentary powers in order to obtain further capital; and the Bill as deposited showed that they wished to raise no less than £160,000. It seemed to him to be desirable that the Council should review their present position; and if they looked at the

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SMETHWICK.

matter as he did, he suggested that they should refer it to the Law Committee to consider the whole matter and report whether or not it was desirable to purchase, and, if so, what course should be pursued. He would move—"That, in view of the Bill now being promoted by the City of Norwich Water-Works Company, it is desirable that the Corporation should reconsider the question of acquiring the undertaking of the Company; that the subject be referred to the Law Committee, with instructions to report to the Council on the advisability of now opening negotiations with the Company for the acquisition of their undertaking, and of promoting (if necessary) a Bill in the next session of Parliament for obtaining compulsory powers." He said it was a non-committal motion—simply a matter of reference to the Committee to consider the position of the Council and then to report. When they had looked into the thing on its merits, he hoped their decision would be unanimous; and if they resolved to go ahead, he trusted they would do their best to obtain the water undertaking for the city. Mr. Henderson seconded the motion. Mr. Hackblock reminded the Council that the difficulty the Committee had in negotiating with the Company was that the latter would have nothing to say or do with them; and unless Mr. Tillett had some knowledge that they would now negotiate, it seemed to him that they would be drifting to the same position as before. The Council must remember that at the time this question was raised and considered, they came to the conclusion that the concern must be run at a loss for the first few years, though they were then able to raise money at 2¾ per cent. To-day 3½ per cent. would be nearer than 2¾; and this would make the temporary burden much harder. He thought the Corporation would have to prove that the Company did not serve the city well, and that the city had great cause of complaint. Mr. Tillett replied that, although money was dearer, the shares of the Company were cheaper. As to what Parliament would do, he was sorry he must venture to differ from the last speaker, for he certainly felt that Parliamentary Committees now took a more enlightened view of this question than they did at the time to which reference had been made. The motion was then agreed to.

Saddleworth Water Supply.—At a meeting of the Saddleworth District Council on Monday last week, strong complaints were made regarding the quality of the water supplied by the Ashton and District Joint Committee. Dr. Ramsden, the Medical Officer of Health, said there was an unusual amount of gastric illness and diarrhœa in the district, which he attributed to the peaty state of the water. There was also lead present. He had informed the Local Government Board that the water had been undrinkable for the greater part of three months, and practically useless for domestic purposes; also that it contained a large amount of peaty acids, which had so great an action on the lead piping that they were seriously threatened with wholesale lead poisoning. The action of Dr. Ramsden in writing to the Local Government Board was upheld by the Council, and the question was left to a Sub-Committee.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

It has been no secret for some time that the Corporation of Glasgow were likely to fill up the vacancies in the chief posts in the Gas Department by the promotion of officials in their own employment. It is now announced that the Gas Committee, at a meeting on Tuesday, resolved to recommend that such should be done in every instance. It is likely that the fairness of the step will be acknowledged by all; but it is just as likely that there will be disappointment in the breasts of many that they are not to get an opportunity of tendering their merits to the Corporation. The posts are so good that it is natural there should be a longing after them. But, of course, this is only the feeling of those who have no claim on the Corporation. It is an unmistakably right principle that those who have served an employer well should receive recognition before outsiders. Mr. Wilson has signalized his advent to power by giving effect to this principle. When these appointments are confirmed by the Town Council—as there is every reason to expect they will be—the gas undertaking will again be fully equipped.

The quality of the gas in Edinburgh and Leith still stalks, a veritable ghost at noon-day. This week it found its way into the Gas Commission; entry being effected by a letter from the Town Clerk of Edinburgh, which was not read. Speaking to it, Sir Andrew M'Donald said it was in connection with the many complaints about the supposed quality of the gas, and also as to the supply. The subject was being investigated by the Committee of the Edinburgh Corporation who take charge of the lighting, and it was mentioned that day at the Works Committee of the Commission. Their Leith friends on the Commission were heartily going into the matter, to assist them. No doubt when they were walking along a street where there was a blaze of electric light, and they turned into a side street, it probably appeared to be very much darker than it would have been if the electric light had not been there. But their arrangements for supplying gas having gone so far out into the suburban districts doubtless had acted upon the pressure in their mains. Their Engineer was doing everything he could to supply district mains; and it was to be hoped that when these were fully completed, in both Edinburgh and Leith, there would be a considerable improvement in the gas. To illustrate the matter, they had just had before the Finance Committee a gentleman who disputed his gas bill. After his meter had been checked, it showed a mere fraction—a few pence—in excess of what it should be; but still he said that his bill was more by a great deal than it should have been, in comparing it with last year or the year before. Their Engineer showed them that this was in one of the areas where a new district main was being laid, and very probably there was an extra pressure going through the pipes, which the gentleman had never been at the trouble to check; and this would account for a good deal of the money which he thought he was being overcharged. Bailie Smith, of

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Leith, said that if consumers would regulate their taps at the meter, they would get the illuminant and would save gas. Now, I do not know that these observations of Sir Andrew M'Donald's will do very much good. They did not, it will be observed, deal with the illuminating power of the gas, except in so far as pressure affects it. The public are not concerned to know whether it is pressure or poverty of the gas which makes it give less light. They want light; and if they do not get it, they blame those who are responsible for supplying the gas. The matter is in the hands of the Engineer, who is doing his best to improve the distribution system—a task which everyone who knows Edinburgh will admit is a most difficult one. But I question if it is good policy to tell the consumers of gas that "they must not be surprised if they find their gas bills a little larger than they were before." A clearer statement upon the subject might advantageously be made. At the conclusion of the passage, Lord Provost Sir Robert Cranston intimated that he had undertaken in the Town Council to put a question there upon the subject; but he thought that, after what had been said, he need not go into the matter now, but leave it to the Committee who had been appointed to deal with it.

Sir Andrew M'Donald, referring to the minutes of a meeting of the Works Committee held that forenoon, said they had that day looked at some estimates for work upon the half section which they were about to add to the Granton works. They would observe, he said, from Mr. Herring's report that the probable cost was estimated at £200,000, and that the sinking fund and interest would require £8500 annually. What he wanted to call attention to was the statement in the report with reference to the economy in the manufacture of gas under the new conditions at Granton, as compared with the old. This represented an annual saving of £2388. There should also be taken into account that the old works would require to be kept going for a time, which was estimated at £2500 a year. These two items together brought out a sum of £4888, which would be saved by manufacturing gas at Granton instead of at New Street. This would be fully half of the interest and sinking fund; and let them hope that, with the scientific arrangements for working, and the bye-products, Mr. Herring would enable them to go on without any rise in the price of gas. If this report came as near the actual thing as Mr. Herring's first estimate, they would have to congratulate him very heartily upon it. He had just told them that all the materials he wanted were in the market at perhaps as low a price as they will be, and he thought that, having resolved to go on with the new half section, it behoved them to do so as quickly as possible, in order to get the advantage of the low market. He hoped they would be able to finish the work even earlier than the Engineer expected, so that they might be in a position to close the New Street works as soon as possible. A Sub-Committee was appointed to attend to the erection of the new works, and to advise as to the sale of the disused works at Leith and Portobello.

At the beginning of the meeting of the Commissioners, suitable reference was made by the Lord Provost and by Provost Mackie, of Leith, to the eminent services rendered to the Commission by the late Mr. Purves. At the close of the meeting, Bailie Bryson, of Leith, was appointed Convener of the Works Committee, in succession to Mr. Purves. Provost Mackie then, with the remark that this made both Conveners hail from Leith, resigned his convenorship of the Finance and Law Commissioners, for which post he proposed Mr. R. Menzies, of Edinburgh. These gentlemen having accepted the offices to which the Commissioners had appointed them, Provost Mackie was thanked for his services upon the Finance and Law Committee.

The Cleaning and Lighting Committee of the Edinburgh Town Council are so exercised over the illuminating power of the gas supplied by the Gas Commissioners that they have this week appointed a Sub-Committee—the one referred to at the meeting of the Gas Commissioners—and instructed them "to obtain testings of the gas at the mains and otherwise throughout the city, independent of the present system of ascertaining the illuminating power." This looks like the introduction of the portable photometer, which, so far, I have not heard of having penetrated to Scotland. I dare say no one will object to the Committee having independent tests of the gas made in various districts of the area of supply, for their own information; but, except for some such purpose, any results they may obtain can be of no further use, as there is a prescribed place for testing and a prescribed mode, which includes the presence of a representative of the Gas Commission. Before this Sub-Committee conclude their labours, they might take note of the light which is given by the Electric Lighting Commissioners in various parts of the city. Certain it is that if they did so they would find how variable is the light, not only in different districts, but in the same districts at various hours.

The Corporation of Kirkcudbright have had more Gas Managers of late years than any other place in Scotland. In February or March, 1901, their then Manager left; and in April, Mr. John F. Irvine, of Kilmarnock, was appointed. Unfortunately, a few months afterwards he was removed by death, and his brother, David Irvine, took his place. Now a difference of opinion as to the occupancy of the house provided for the Gas Manager has led to Mr. Irvine leaving. But a fortnight ago it was announced that Mr. James Hamilton, of Rothesay, had received the appointment. This, however, did not settle the business, for at a meeting of the Corporation last week it was intimated that Mr. Hamilton had declined the appointment on account of his having received another position. To get out of the situation the Corporation were in, Provost M'Ewen said that when he was told Mr. Hamilton could not come, he suggested that they should write to all the gentlemen who were on the short leet, acquainting them with what had taken place. The Town Clerk said he had written to all the gentlemen except Mr. Irvine, whose address he did not know, and that the only one who had replied was Mr. John Gibson, of Dalmellington, who stated, in his reply, that he was still willing to accept the appointment, and that he could take up the duties at any time. Mr. Wallace moved that Mr. Gibson be appointed. Mr. Brown thought the next on the roll (Mr. Irvine) should have the position. He was asked to propose Mr. Irvine, but did not, and Mr. Gibson was then

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SALTLEY WORKS, BIRMINGHAM	2,000,000	PETERBOROUGH, ONT. . .	250,000	STRETFORD	500,000
COLCHESTER	300,000	WILKESBARRE, PA. . . .	750,000	OLDBURY	300,000
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WINDSOR ST., BIRMINGHAM (Second Contract) . . .	2,000,000	COLCHESTER (Second Contract)	300,000	ROCHESTER (Second Contract) .	500,000
HALIFAX	1,000,000	YORK	750,000	NEWPORT (MON.)	250,000
TORONTO	250,000	ROCHESTER	500,000	TOKIO, JAPAN	1,000,000
OTTAWA	250,000	KINGSTON, ONT.	300,000	PERNAMBUCO (Brazil) . .	125,000
LINDSAY (Remodelled) . .	125,000	CRYSTAL PALACE DISTRICT .	2,000,000	MALTON	150,000
MONTREAL	500,000	DULUTH, MINN.	300,000	DULUTH, MINN. (Second Contract)	300,000
TORONTO (Second Contract Remodelled)	2,000,000	CATERHAM	150,000	BROCKVILLE (ONT.) . . .	250,000
BELLEVILLE	250,000	LEICESTER	2,000,000	SMETHWICK	500,000
OTTAWA (Second Contract). .	250,000	ENSCHEDE (HOLLAND) . .	150,000	GRAVESEND	300,000
BRANTFORD (Remodelled) . .	200,000	BUENOS AYRES (RIVER PLATE CO.)	700,000	NEWPORT MON. (Second Contract)	250,000
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Complete Gas-Works at NELSON, BRITISH COLUMBIA.

LEEDS, 1,800,000 C. Ft. LEICESTER (2nd Cont.), 1,000,000 C. Ft. NEWCASTLE-ON-TYNE, 1,800,000 C Ft.
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unanimously appointed. Like a younger son falling heir to an estate, he now fills a post which but two weeks ago seemed hopelessly closed to him. I congratulate him upon his luck.

Mr. Wm. Dyack, the Burgh Surveyor of Aberdeen, has prepared a report dealing with the condition of the aqueduct carrying the water supply to the city, in which he says: "Up to the commencement of last summer, repairs had, as a rule, been carried out twice a week; but owing to the many complaints of insufficient supply, resulting principally from this method of procedure, and the consequent impossibility of keeping the Mannofield reservoirs full, it was found necessary to restrict the carrying out of repairs to one day per week; and I am of opinion that, owing to the increasing consumption, it will be impossible to revert to the former arrangement of executing repairs twice a week without seriously inconveniencing consumers. I desire to point out that the average quantity consumed during the month of June last amounted to over 7½ million gallons, or within half-a-million gallons of the maximum amount the Council is empowered to abstract from the River Dee; and it is thus only a question of a few years when it will be found impossible to shut off the water in the aqueduct without interrupting the continuity of the supply to the inhabitants. In this case, no repairs can be carried out; and as it is found that every year incipient leaks occur in various parts of the aqueduct, which, if not attended to without delay, may increase and lead to serious consequences, it is absolutely necessary that they should be repaired as soon as they are discovered. The water having to be turned off for this purpose, the city supply will then require to be interrupted—thus causing great inconvenience and possibly disastrous consequences in case of fire breaking out at the time. In view of these circumstances, I beg respectfully to urge the Committee to have early steps taken for the purpose of considerably augmenting the present supply, or introducing a new and adequate supply sufficient to cope with the needs of the increasing population of the city."

Reduction in Price.—The Brighton and Hove Gas Company announce that after the December quarter's meter reading the price of gas in the districts supplied by them will be reduced by 1d. per 1000 cubic feet. This brings the price down to 2s. 11d.

First Lighting of Westminster Bridge by Gas.—The issue of the "Globe" for Jan. 2, 1815, contained the following intimation: "Westminster Bridge was on Saturday night for the first time illuminated with gas-lights. The bridge made a most brilliant and splendid appearance."

Wooden Water Pipes.—It is reported from Mexico that application has been made, under the law of Dec. 14, 1898, for permission to establish in the Republic, as a new industry, the manufacture of wooden tubing for bringing water in large quantities, and from a distance, in cases where the cost of conveying it in any other form would constitute an obstacle to the erection of hydraulic works.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Jan.* 2.

Sulphate of Ammonia.

There being rather large requirements in Scotland for the Pacific and for Japan, the market opened with good demand at all points; and this has been sustained up to the close, although prices have advanced to £12 12s. 6d. per ton f.o.b. Hull, and to £12 15s. per ton f.o.b. Liverpool and Leith. Purchases for January delivery have also been made at the advanced prices. For delivery over the spring months, the same figures could be obtained; but, the large makes being already rather fully sold before the latest advance, the makers are for the most part now off the market, or else holding for prohibitive prices.

Nitrate of Soda.

This is very firm in all positions, with spot prices at 9s. 9d. to 10s. per cwt. for ordinary and refined qualities respectively.

LONDON, *Jan.* 4.

Tar Products.

There is very little doing in tar products, doubtless owing to the holidays; prices, as a rule, being easier all round. Pitch is decidedly weak; low prices having been accepted in several instances both for prompt and forward delivery. The principal weakness is in the North, where very low prices are reported as having been accepted for both prompt and forward. So far as London is concerned, there is not much change; but buyers will not pay the price asked by manufacturers. The consumption in South Wales and Belgium has evidently fallen off for a time, as buyers are not at all anxious to take delivery of the quantities due at the end of the year. In benzol, the demand keeps fairly good, especially for 90 per cent., which is being still considerably used for enriching gas. The demand for aniline making is not so strong; and the 50-90 per cent. does not command much attention, either for prompt or forward delivery. There is absolutely nothing doing in toluol; and prices are purely nominal. In anthracene, business has been done in fairly good quality, 38-40 per cent., at from 1⅜d. to 1½d. for prompt delivery; while it is reported that an offer of 2¼d. was declined for the best London make all over next year. There is nothing at all doing in solvent naphtha at present; but prices are well maintained. Creosote is decidedly firm, both in London and the provinces. The demand for export still continues strong; but, owing to the difficulty in obtaining barrels, London makers cannot accept orders.

The average values during the week were: Tar, 22s. 6d. to 27s. Pitch, London, 39s. to 39s. 6d.; east coast, 35s. to 37s.; west coast, 34s. to 35s. Benzol, 90 per cent., 10⅜d. to 11d.; 50-90 per cent., 7⅞d. to 8d. Toluol, 7½d. to 8d. Crude naphtha, 3½d. to 3¾d.; solvent naphtha, 9½d. to 10d.; heavy naphtha, 11d. to 1s. Creosote, London, 1⅛d.; North, 1⅛d. Heavy oils, 2¼d. to 2½d. Carbolic acid, 60 per cent., 1s. 6d. to 1s. 6¼d. Naphthalene, £5 to £8. Salts, 23s. 6d. to

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PREVENTS NAPHTHALENE DEPOSITS.
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26s. Anthracene, "A" quality, 1¾d. to 2d.; "B" quality, 1d. nominal. Light oils, 2½d. to 3d.

Sulphate of Ammonia.

The market is very firm indeed. Beckton quote £12 17s. 6d. in any position, but are not anxious to sell. The South Metropolitan Company placed a considerable quantity at £12 17s. 6d. for February shipment, but are not anxious to repeat business at the same price. Some quantity has been sold in Hull at £12 12s. 6d. for prompt shipment; and the demand seems very good in this quarter all round. In Leith, sales have been made at £12 12s. 6d. January-February; but makers now ask £12 13s. 9d. over this period. The market in Liverpool is very firm; but there is not much offering.

COAL TRADE REPORTS.

Lancashire Coal Trade.

The holidays, which, taking them altogether, have represented about a week's stoppage of the pits throughout Lancashire, have, of course, considerably interfered with usual operations; but as works and mills have also generally been stopped over similar, and in some instances longer, periods, the temporary cessation of output has been fully counterbalanced by absence of requirements—at any rate, for iron-making, steam, and general manufacturing purposes. For house-fire qualitities there has been some pressure, and collieries have had as much as they could do to keep up with deliveries; while the setting in of severe weather during the last few days has tended to give an added impetus to demand. House-fire coal prices remain, however, without any quotable change; nor is there indication of any probable upward move. The average quotations are not more than firm at from 13s. 6d. up to 14s. 6d. to 15s. per ton at the pit for best qualities, 11s. and 11s. 6d. up to 12s. 6d. for seconds, and 9s. 6d. to 10s. 6d. for the common sorts of house-fire coal. The lower descriptions of round coal suitable for steam and forge purposes are fairly plentiful on the market, and do not average more than about 8s. to 8s. 3d. per ton for ordinary qualities up to 8s. 6d. and 8s. 9d. for some of the special sorts. Of engine classes of fuel, apart from one or two special sorts, there are also ample supplies on the market. Some of the Lancashire collieries have been rather short during the past week; but there is a good deal of surplus still lying at collieries in outside districts, which comes on the market here at low figures, and checks any real stiffening in Lancashire prices. These remain about 6s. to 6s. 9d. per ton for the best qualities, 5s. to 5s. 6d. for medium, and 4s. to 4s. 6d. for common. For shipment, there has been a moderate inquiry, with prices perhaps rather steadier; ordinary qualities of steam coal averaging 9s. 6d. to 9s. 9d. delivered at the ports on the Mersey.

Northern Coal Trade.

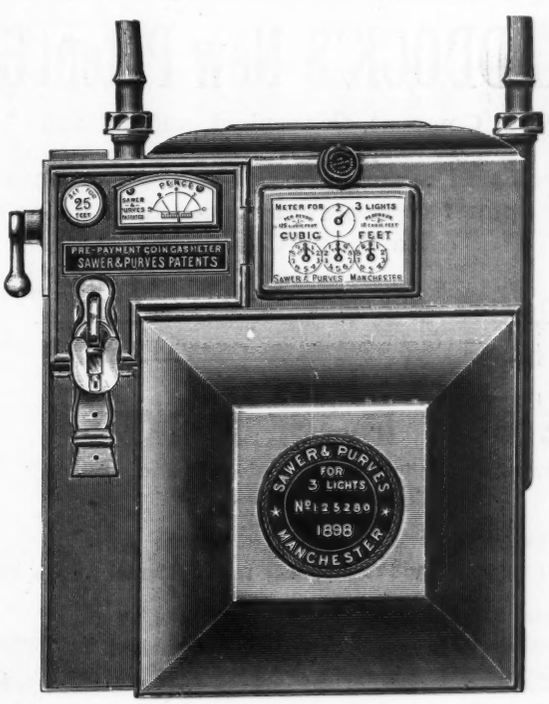
Though the holidays have interrupted the shipments of coal, the trade has been active, and there has been a full production at most of the collieries. In the Northumbrian steam coal trade, the demand is fairly good for this season; and the price is steady at about 9s. 6d. per ton f.o.b., second-class steams are from 8s. 3d. to 8s. 6d., and steam smalls are weak at about 4s. to 4s. 3d. In a day or two, it is hoped that the demand and supply will be normal. In the gas coal trade, a very heavy demand has been well met on the whole; but the large contracts have not left a great margin of coal for sale. For occasional cargoes, the price of Durham gas coal has varied from 8s. 3d. to 9s. per ton f.o.b., according to quality. The full consumption of gas coals seems likely to continue during the whole of the present month. Gas coke appears to have the full output well taken up on the whole, possibly because more is being used at some of the gas-works. The medium price for export is about 14s. 6d. per ton f.o.b. in the Tyne.

Scotch Coal Trade.

Trade finished up for the year rather under a cloud, and with no very rosy prospect. The export trade is still going down; and the home trade is not at all elastic. The holiday break in the mines may have the effect of raising prices temporarily. The prices quoted are: Main 7s. 6d. to 7s. 9d. per ton f.o b. Glasgow, ell 8s. 9d. to 9s. 6d., and splint 9s. 3d. to 9s. 6d. The shipments for the week amounted to 215,570 tons—a decrease of 14,701 tons upon the previous week, and of 202 tons upon the corresponding week of 1902. For the year, the total shipments amounted to 11,173,459 tons—an increase of 115,567 tons upon 1902.

Trade Union Tyranny in America.—In the "JOURNAL" for Nov. 17, we reproduced from the "Boot and Shoe Trades Journal," some particulars of a case of Trade Union tyranny at Leicester. The following paragraph, from the "Railroad Gazette," will give an indication of the effect of this tyranny on business in the United States: "The summary of Trade Union outrages in the United States during October, in addition to the customary list of murders, assaults, and cases of members who have been reduced to destitution and driven to crime by not being allowed to work, includes the closing of a ship-building establishment which had done a prosperous business and maintained an extended pay-roll through many years, but, by yielding to Trade Union demands, had become so subject to labour tyranny that it was forced completely out of business. Another instance is of one of the best-known publishing establishments in the United States abandoning plans for a $1,000,000 plant in the city in which it has given employment to thousands of men for half-a-century, because the demands of the Labour Unions have made it unable to compete with similar establishments in other cities not so hampered."

THE ABOVE REPRESENTS THE SIZE OF OUR BUSINESS WHEN THE "POSITIVE" SLOT METER WAS FIRST MADE IN 1889.



SAWER & PURVES,

MANCHESTER
AND
NOTTINGHAM.

IT HAS INCREASED IN RATIO TO THE ABOVE, SINCE THE POPULARITY AND PRE-EMINENCE OF THE "POSITIVE" SLOT METER BECAME PRONOUNCED.

Skegness Water Supply.—The Earl of Scarborough has appointed Mr. Percy Griffith, M.Inst.C.E., F.G.S., of Westminster, as Consulting Engineer, to report upon the water supply of Skegness. This popular seaside resort has increased at such a rapid rate that the present works are inadequate to meet the summer demand, and, owing to the presence of salt in the greensand beds underlying this part of Lincolnshire, it is probable that a new source of supply will have to be found.

Extensions at the Ringwood Gas-Works.—The Ringwood Gas Company have lately carried out some important extensions, comprising enlargement of retort-house, new office with show-room, Board-room over, and boiler and exhauster house. Some portions of the old retort-house have been utilized; but the roof has been entirely renewed. The area of the new house is 35 ft. by 42 ft., the office and Board-room are each 21 ft. by 15 ft., and the boiler and exhauster house 21 ft. by 15 ft. The whole was arranged and designed by Mr. Norton H. Humphrys, Assoc.M.Inst.C.E., of Salisbury, and the construction was undertaken by local firms under his superintendence.

Prepayment Gas-Meters for Oldham.—The Oldham Gas Committee, after considering a statement on the subject prepared by the General Manager (Mr. Arthur Andrew), have resolved upon the adoption of prepayment meters in certain cases. As all meters at present belong to the property owners, it has been decided that they shall not be relieved from their obligation to provide such meters, but that prepayment ones shall only be supplied in those cases where otherwise the tenant would not consume gas. The present net price for gas to small consumers is 2s. 3d. per 1000 cubic feet; and the prepayment meters will be arranged to supply 30 cubic feet for 1d. Two-light wet meters only will be fitted as a commencement.

Dividend warrants at the rate of 6 per cent. on the £5 preference shares in the Richmond Gas Stove and Meter Company, Limited, have been posted, together with interest on the 4 per cent. debenture stock.

The Spennymoor and Tudhoe Gas Company have placed with Messrs. Robert Dempster and Sons, Limited, of Elland, the order for a telescopic gasholder, 80 feet in diameter by 22 feet deep, tenders for which were recently invited in our advertising columns.

The South Yorkshire gas coal trade last year was, on the whole, a fair average one. Local coalowners enjoyed a fair number of contracts at a reduction of from 6d. to 9d. per ton on 1902 rates. The coke trade throughout the year was, with few exceptions, in a sluggish state.

One of the 30-inch mains of the Southwark and Vauxhall Water Company which run through Surbiton burst last Friday morning, and flooded the basements of some of the houses in the vicinity. Steam fire-engines were requisitioned to pump the water out; and the Chief Officer of the Surbiton Fire Brigade had a narrow escape from drowning through falling into a hole in the road while endeavouring to locate the leak.

The Board of the Barking Gas Company have apparently been considering the position of debenture stock, to which attention was called in an article in the "JOURNAL" for the 22nd ult., for they announce that since advertising the issue of redeemable 4 per cent. debenture stock, they have decided to make the issue in the form of mortgage debentures of £25 each. The date for the receipt of tenders is extended to Thursday next, the 7th inst.

The Anthracite Agency and Distribution Company, Limited, has been formed, with a capital of £100,000, in £1 shares (50,000 being 6 per cent. cumulative preference shares), to carry on, in England or elsewhere, the business of colliery agents and coal merchants; to undertake a sole sales agency for the new Company intended to be formed by the South Wales Anthracite Amalgamation Syndicate, Limited; and to generally act as coal merchants and factors, manufacturers of, and dealers in, solid or liquid fuel, owners of steam and other ships and barges, &c.

In connection with the remarks in the "JOURNAL" for the 8th ult., on the "Cost of Councillors' Luncheons," it is interesting to record that the Corporation of the City of London, after a considerable discussion, have declined to reduce or alter the customary allowances which are paid for expenses of hospitality to their 24 Committees. It appears that a similar result followed an inquiry on the same subject eight years ago. The General Purposes Committee, who recently considered the matter, were unanimously of opinion, in the interests both of the Corporation and the public service, that the allowances, which vary from £50 to £400 per annum, and amount in all to £4300, should be continued; but they considered that there might be retrenchment in various directions, and made suggestions whereby a saving of nearly £700 a year could be effected. The Court, however, determined to adhere to the present arrangement, and by a narrow majority negatived the Committee's report and suggestions. How the matter will be regarded by individual members remains to be seen.

The fourth annual meeting of Metropolitan Gas Meters, Limited, was held at Winchester House, E.C., on the 31st ult.—Mr. L. R. de Fonblanque in the chair. In presenting the Directors' report, the Chairman pointed out that the balance on the trading account was £5733; the net profit being £1942. From this they had deducted £500 on account of preliminary expenses in connection with the formation of the Company; and £572 had been charged to depreciation of plant and tools, against £250 in 1902. The credit balance was £916. In the first half of the year, the increase of business over the preceding year was 70 per cent. in sales and 50 per cent. in actual invoice amounts; but in the second half the business done was no more than 19 per cent. increase in actual sales, and 10 per cent in invoice amounts. Not only had they had to contend with a falling off in their sales, but in prices as well, on account of competition. In consequence of their being severely handicapped for want of accommodation, they had sold their London premises, and had acquired new workshops and offices at Hyson Green, Nottingham.

BRADDOCK'S New Patent GAS STATION GOVERNOR

Most Compact, Convenient, and Efficient.

Valves and other internal parts are accessible upon the removal of the Side Plate of the Valve-Chamber.

Occupies very little Space. The Flange diameter is about the greatest width.

THE BEST IN THE MARKET.

Over 80 (4 in. to 36 in. inclusive) in use.

The distance from the centre of Mains to the floor-level may be made to suit any requirements.

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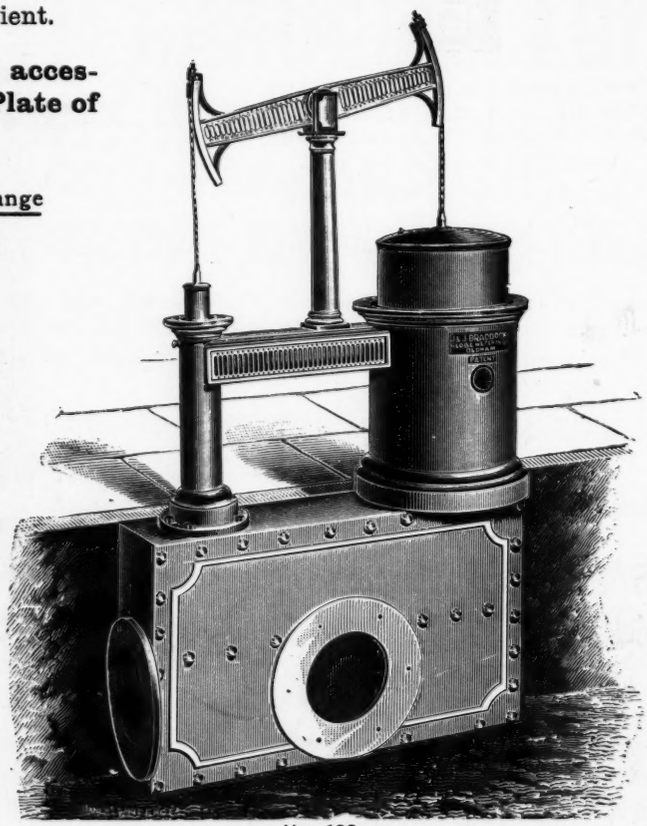

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NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

TERMS OF SUBSCRIPTION to the "JOURNAL."

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Subscribers who desire to avail themselves of the reduction in the Subscription by paying in advance for the Year 1904, are reminded that this can only be done during the current month.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

CHEMICAL ENGINEER. "Acid," care of Streets.
MANAGER. Portland Gas-Works. Jan. 7.
ASSISTANT CHEMIST. Salford Gas Department. Jan. 13.
WORKING MANAGER AND SECRETARY (Small Works). Robert Eccles, Preston.
GAS TESTER. Town Hall, Chiswick.
DRAUGHTSMAN. No. 4142.
APPRENTICES (Two) GAS ENGINEERING FIRM. No. 4102.
DISTRIBUTING FOREMAN (Water-Works). No. 4143.
WORKING FOREMAN. Exeter Gas-Works.
METER MAKER (WETS AND DRYS). No. 4147.
TINMAN. No. 4144.

Situation Wanted.

FITTINGS INSPECTOR. No. 4145.

Plant for Sale.

CONDENSER, GOVERNOR, REGULATOR, ROOF, FURNACE MOUNTINGS AND FITTINGS, &c. Stonehaven Gas-Works.
GAS-WORKS (SMALL) COMPLETE. Chisholm and Law, Glasgow.

Plant for Sale—(*continued*).

STATION METER. Shepshed Gas-Works.
RETORT-BENCH FITTINGS, &c., BOILERS, EXHAUSTER, CONDENSERS, SCRUBBER, PURIFIERS, STATION METER, GASHOLDER, VALVES, &c. Ardrossan Gas Department. Offers by Jan. 15.

Sales of Stocks and Shares.

BARKING GAS COMPANY. Jan. 19.
CROYDON GAS COMPANY. Jan. 19.
LOWESTOFT WATER AND GAS COMPANY. Jan. 19.
NEW RIVER COMPANY. Jan. 14.
SHREWSBURY GASLIGHT COMPANY. Jan. 27.

TENDERS FOR

Benzol.

ISLE OF THANET GAS COMPANY. Tenders by Jan. 14.

Bricks (Various).

EDINBURGH AND LEITH GAS DEPARTMENT. Tenders by Jan. 25.

Coal.

COPENHAGEN LIGHTING DEPARTMENT. Tenders by Jan. 19.

Fire-Clay Goods.

BURY GAS DEPARTMENT. Tenders by Jan. 18.
HEYWOOD GAS DEPARTMENT. Tenders by Jan. 19.

Gas-Producer Plant. No. 4146.

Pipes and Specials.

DEVONPORT GAS DEPARTMENT. Tenders by Jan. 30.
ISLE OF THANET GAS COMPANY. Tenders by Jan. 14.

Pipe Laying.

DEVONPORT GAS DEPARTMENT. Tenders by Jan. 30.

Retorts.

BURY GAS DEPARTMENT. Tenders by Jan. 18.
HEYWOOD GAS DEPARTMENT. Tenders by Jan. 19.

BOOKS AND LEAFLETS

TO BE OBTAINED OF

WALTER KING,

11, BOLT COURT, FLEET STREET, E.C.

THE VALUATION OF GAS, ELECTRICITY, AND WATER-WORKS FOR ASSESSMENT PURPOSES.—Second Edition. By THOMAS NEWBIGGING, M.Inst.C.E., and WILLIAM NEWBIGGING, Assoc.M.Inst.C.E. *Price 5s.*

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LAW OF LONDON GAS COMPANIES.—By T. J. BARNES. *Price 6s.*

PRECEDENTS IN PRIVATE BILL LEGISLATION AFFECTING GAS AND WATER UNDERTAKINGS, 1891-1901 (the Volume for 1879-1890 is still on Sale).—By E. H. STEVENSON and E. K. BURSTAL, MM.Inst.C.E. *Price 21s.*

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"VOLCANIC" FIRE CEMENT.

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First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.

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PREPARED from Pure Iron.

Twice as Rich as Bog Ore.
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Surrey Engineering Works, Blackfriars Road, London, S.E.

Telephone: 1693 Hop. Telegrams: "Luminosity."

ADVERTISER, Age 30, seeks re-engage- ment at the end of January as FITTINGS INSPECTOR. Practical knowledge of Gas-Fitting in all branches, including Automatic Work. Well up in the control of Workmen, Time Sheets, and the reading of Meter Indices. Capable of superintending Show-Rooms. References.

Address No. 4145, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

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WILL Applicants please note that this post is NOW FILLED.

TWO Apprentices wanted by a firm of Contracting Gas Engineers. Must be well Educated.

Apply, giving full Particulars, to No. 4132, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, a Smart Tinman thoroughly acquainted with making Dry Gas-Meters. Permanent employment for suitable man.

Apply, by letter, stating Age and Experience, and enclosing Testimonials, to No. 4144, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

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WANTED, a Foreman for Distribution Department. Population 80,000.

State Experience, with *copies* of Three recent Testimonials, Age, Wages required, &c., to No. 4143, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

CHEMICAL Engineer Wanted. Must have had Experience in Erecting and Managing Sulphuric Acid Plants. Only men who have already occupied important and responsible positions need apply.

State fully past Experience, Age, and Salary required to "Acid," care of Street's, 30, Cornhill, London, E.C.

WANTED, a Working Manager and Secretary at a small Gas-Works, competent to undertake the entire management, and accustomed to Slots and Fixing generally.

Applicants to state Experience and give recent Testimonial on or before Tuesday the 12th of January. State Age and Salary required. House, Coal, and Gas free.

Applications to be addressed to Robert Eccles, 275, St. Paul's Road, Preston.

WANTED, a Working Foreman with a good knowledge of Regenerative Firing and Mechanics, and accustomed to the routine of a Gas-Works making about 300 Millions per Annum. House, Coal, and Gas provided.

Apply, by letter, stating Age, Experience, Wages required, and where now employed, with three Testimonials, to the Chairman, Exeter Gas Company, Exeter, marked "Application."

COUNTY BOROUGH OF SALFORD.

(Gas Department.)

THE Gas Committee are prepared to receive APPLICATIONS for the appointment of ASSISTANT-CHEMIST at their Works. Candidates must have had Experience in a Gas-Works Laboratory.

Salary to commence at £96 per annum.

Applications, endorsed "Assistant-Chemist," stating Age, &c., and accompanied by *copies* of not more than Two recent Testimonials, to be addressed to the Chairman of the Gas Committee, Town Hall, Salford, and delivered to me not later than Three p.m. on Wednesday, the 13th of January, 1904.

L. C. Evans,
Town Clerk.

Town Hall, Salford,
Dec. 29, 1903.

URBAN DISTRICT OF PORTLAND.

APPOINTMENT OF GAS MANAGER.

THE Gas-Works Committee of the Urban District Council of Portland invite APPLICATIONS for the Appointment of MANAGER of the Portland Gas-Works. Commencing Salary, £110 per annum, payable monthly, with House, Coals, Light, and Water free.

Applications, in candidate's own handwriting, accompanied by *copies* of Three Testimonials, must be sent to me, marked "Gas Manager," not later than Thursday, the 7th of January, 1904.

Candidates are requested to give the earliest date upon which they would be prepared to enter upon the duties if appointed.

James Howard Bowen,
Clerk to the Gas Committee.

Council Offices, Portland,
Dec. 21, 1903.

WANTED, a good all-round Gas-Meter Maker for Wets and Drys; also for Repairs. Must be a steady man.

Apply, by letter, to No. 4147, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

GAS TEST.

A NUMBER of Local Authorities in the West of London require the services of a GAS EXAMINER.

Apply to Mr. Ernest F. Collins, Town Hall, Chiswick.

DRAUGHTSMAN WANTED.

WANTED, immediately, a thoroughly practical DRAUGHTSMAN, well up in Steel Tanks, Gasholders, and Inclined Retorts.

Apply, by letter, with *copies* of References, to No. 4142, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

GAS-PRODUCER PLANT.

WANTED, an up-to-date Economical Plant of small capacity.

Send full Particulars to No. 4146, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

ADVERTISER is able to sell Gas-Pipes from 500 waggons upwards.

Write to Aurel Krausz, Budapest, Soroksarerstrasse 88.

SMALL Gas-Works for Sale at Garn- kirk, near Glasgow.

Offers received by Chisholm and Law, 187, West George Street, Glasgow.

1500 Feet Cowan Station Meter, with 4-inch Connections and Bye-Pass Valves, in Good Working Order, FOR SALE.

Shepshed Gas-Works, Leicestershire.

WANTED, Offers for 7-inch Vertical Condenser, 6-inch Governor, with bye-pass, Fison's Regulator, Iron Roof, Furnace Fronts and Mountings (regenerative), Hydraulic Main, Bench Fittings, &c.

For further Particulars apply to the Manager, Gas-Works, Stonehaven, N.B.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.

J. F. Blakeley, Gas Engineer, Thornhill, Dewsbury.

TO BE SOLD — Twin-Cylinder Gas- ENGINE, 6 n.h.p., by Crossley; Cylinders 8 in. diameter by 18 in. stroke, and Gas-Bag.

NEW GASHOLDER SHELLS, 40 feet diameter by 12 feet deep, and 50 feet diameter by 15 feet deep, with or without New Steel Tanks and Standard Guides.

Write J. Wright, 181, Queen Victoria Street, London, E.C.

GAS PLANT FOR SALE.

THE Ardrossan Town Council have for SALE at their old Gas-Works, Glasgow Street, Ardrossan, the following Plant—viz., Retort-Bench Fittings, Wrought-Iron Hydraulic Main, Vertical Steam-Boiler, Small Exhauster, Two Condensers (8-inch and 4-inch), Vertical Scrubber, Four Purifiers (12 feet square with or without overhead Lime Floor and Shed), Two Station Meters, Gasholder (40 feet diameter and 14 feet deep), Three Egg-end Boiler-Tanks, Small Tangye Pump, Piping Valves, Cocks, and other Castings.

Mr. A. Gillespie, Consulting Engineer, 65, Bath Street, Glasgow, will supply Particulars; and Offers are to be lodged with the Subscriber not later than the 15th of January, 1904.

James Cook,
Town Clerk.

Ardrossan, December, 1903.

THE Gas Committee of the Corporation of Heywood are prepared to receive TENDERS for the supply of RETORTS and FIRE-CLAY GOODS.

Specification and Quantities and Form of Tender may be obtained upon application to Mr. W. Whatmough, Gas Manager.

Contractors tendering for this work must pay their workpeople at least the Standard or Trade Union Rate of Wages, and observe the trade conditions which attach to the various kinds of work for which the Tender is sent in.

Tenders, endorsed "Retorts and Fire-Clay Goods," to be sent to me not later than Tuesday, Jan. 19, 1904.

By order,
Geo. G. Bouchier,
Town Clerk.

Municipal Buildings, Heywood,
Dec. 16, 1903.

TENDERS FOR GAS COAL.

THE Lighting Department of Copen- hagen are prepared to receive TENDERS for the supply and delivery of 150,000 Tons of best GAS COAL from the beginning of March until the end of December, 1904.

The Lighting Department reserve the right to divide the Contracts between two or more Contractors.

Further Information and Conditions for the delivery may be obtained on application to Direktören for Kobenhavns Belysningsvœsen, Vestre-Boulevard 22, Copenhagen B.

The Tenders, sealed and marked "Tilbud paa Kul," to be sent to Direktören for Belys, Ningsvœsnet, Vestre-Boulevard No. 22, Kobenhavn B, before the 19th of January, 1904, Twelve o'clock, at which time the Tenders will be opened in the presence of the parties tendering who are in attendance.

The Lighting Department of Copenhagen.
Dec. 22, 1903.

TAR Contracts Wanted on the Sliding- Scale or at Fixed Prices.

Managers and Secretaries desirous of selling to best advantage please communicate with Dent and Co., Ouse Chemical Works, Selby.

COUNTY BOROUGH OF BURY.

TO RETORT AND FIRE-BRICK MANUFACTURERS.

THE Gas Committee are prepared to receive TENDERS for RETORTS, FIRE-BRICKS, and FIRE-CLAY required at their Gas-Works.

Forms of Tender may be obtained from Mr. H. Simmonds, Engineer and Manager, Gas-Works, Elton, Bury.

Tenders, sealed and endorsed "Tender for Retorts, &c.," to be sent to the undersigned not later than Monday, the 18th of January, 1904.

John Haslam,
Town Clerk.

Municipal Offices, Bank Street,
Bury, Dec. 30, 1903.

ISLE OF THANET GAS COMPANY, MARGATE.

TENDERS FOR BENZOL.

THE Directors of the above Company are prepared to receive TENDERS for the supply of 90 per cent. BENZOL from January, 1904, to January, 1905.

Full Particulars of Quantity, &c., can be had on application to the Engineer, Mr. James Dougall, Gas-Works, Margate.

Tenders, to be endorsed "Benzol," addressed to the Chairman, and sent in not later than Jan. 14 next.

The Directors do not bind themselves to accept the lowest or any Tender.

By order,
T. C. Fuller, F.C.I.S.,
Secretary.

The Offices, The Dane,
Margate, Jan. 1, 1904.

ISLE OF THANET GAS COMPANY, MARGATE.

TENDERS FOR CAST-IRON MAINS AND SPECIALS.

THE Directors of the above Company are prepared to receive TENDERS for 4-inch, 6-inch, and 12-inch MAINS and SPECIALS.

Specification and full Particulars can be had on application to the Engineer, Mr. James Dougall, Gas-Works, Margate.

Tenders, to be endorsed "Iron Mains," addressed to the Chairman, and sent in not later than Jan. 14, 1904.

The Directors do not bind themselves to accept the lowest or any Tender.

By order,
T. C. Fuller, F.C.I.S.,
Secretary.

The Offices, The Dane,
Margate, Jan. 1, 1904.

DEVONPORT GAS-WORKS.

THE Corporation of Devonport are prepared to receive TENDERS for the following

Contract No. 4.
CAST-IRON MAIN PIPES and APPENDAGES.

Contract No. 5.
EXCAVATING for and LAYING CAST-IRON MAIN PIPES and APPENDAGES.

Copies of the Specification and Form of Tender can be obtained, and the Drawings seen, on and after Tuesday, the 12th of January, 1904, at the Offices of the Engineers, Messrs. Stevenson and Burstal, 98, Parliament Street, Westminster, or at the Gas-Works, Devonport.

A charge of One Guinea will be made for each copy of the Specification of each Contract, which will be returned on receipt of a *bonâ-fide* Tender.

Tenders must be delivered sealed, addressed to the undersigned, at the Offices of the Corporation on or before Noon of Saturday, the 30th of January, 1904.

The Corporation do not bind themselves to accept the lowest or any Tender.

R. J. Fittall,
Town Clerk.

Town Clerk's Office, Devonport,
Dec. 29, 1903.

EDINBURGH AND LEITH CORPORATIONS' GAS COMMISSIONERS.

TO BRICK AND TERRA-COTTA MANUFACTURERS.

THE Commissioners are prepared to receive TENDERS for the supply of Ordinary and Special Composition Terra-Cotta, Enamelled, and Glazed BRICKS, delivered in Railway Waggons at their Sidings, Gas-Works, Granton, near Edinburgh (Caledonian or North British Railway Systems), or free on rail alongside Quay, Granton Harbour.

Deliveries to commence about the end of March, 1904, and to continue for a period of about Two Years. There will be about 2 Million Composition Bricks and 300,000 Red Terra-Cotta Facing Bricks, in addition to Arch Bricks, Bull Nose, Splays, &c.

Full Particulars and Schedules of Quantities and Forms of Tender can be obtained upon application to Mr. W. R. Herring, M.Inst.C.E., Chief Engineer and Manager, New Street Works, Edinburgh.

Tenders to be lodged with the undersigned on or before Monday, the 25th day of January, 1904, at Ten a.m., sealed and endorsed "Tender for Composition and Terra-Cotta Bricks, &c."

The Commissioners do not bind themselves to accept the lowest or any Offer, and reserve to themselves the right of accepting the whole or any portion of the materials tendered for, and, further, to nominate more than one party to supply their requirements in the nature of both Composition and Terra-Cotta Facing Bricks.

James M'G. Jack,
Clerk.

25, Waterloo Place, Edinburgh,
Dec. 26, 1903.

STEEL TANK

AND

THREE-LIFT GASHOLDER

112 feet Diameter,

AT THE

CHESTERFIELD GAS-WORKS.

Contract includes Excavations and Concrete Bed 3 feet deep.

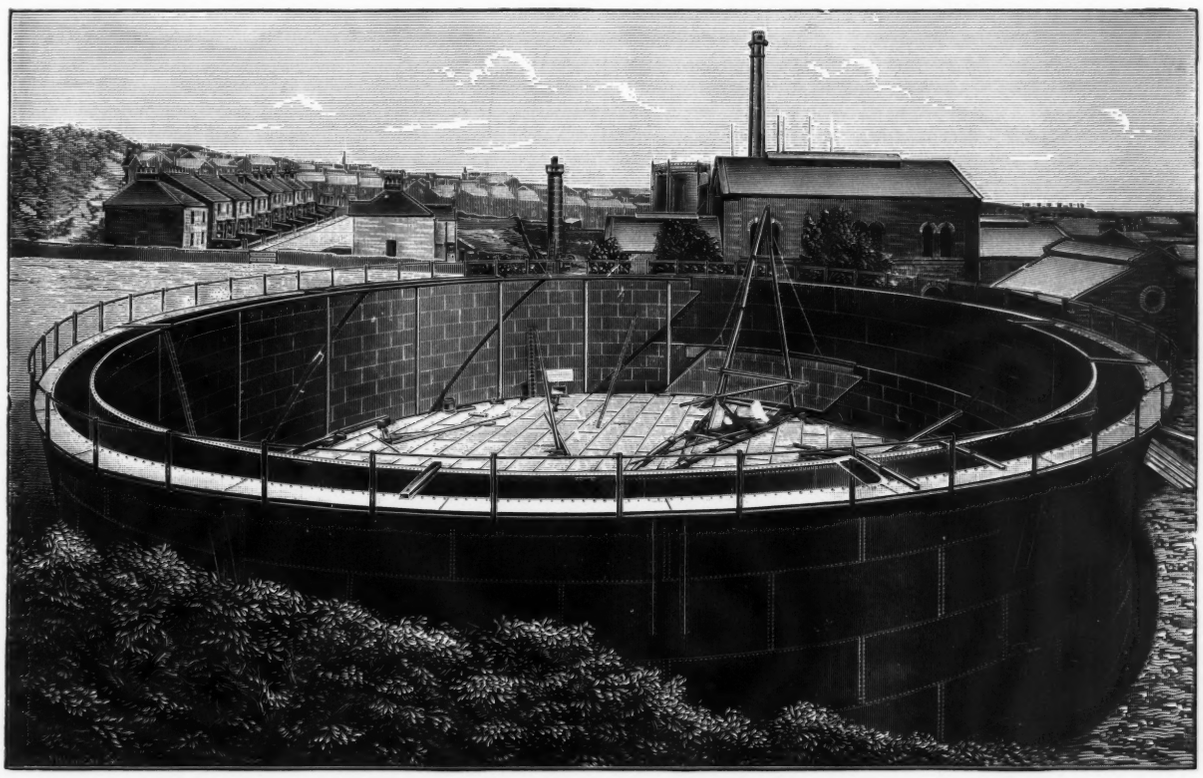

Photo. showing state of Work **3 MONTHS** after receiving Order.

NO SUB-CONTRACTING.

CONTRACTORS:

ROBERT DEMPSTER & SONS, LIMITED.

ELLAND.

Printed for WALTER KING, by King, Sell, and Olding, Ltd.; and published by him at 11, BOLT COURT, FLEET STREET, in the CITY OF LONDON.—Tuesday, Jan. 5, 1904.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at MR. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
CROYDON COMMERCIAL GAS AND COKE COMPANY.

NEW ISSUE OF £3620 FIVE PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Jan. 19, 1904, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

BARKING GAS COMPANY.

93 £10 ORDINARY 7 PER CENT. SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Tuesday, Jan. 19, 1904, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

LOWESTOFT WATER AND GAS COMPANY.

SALE BY AUCTION OF 400 ADDITIONAL ORDINARY £10 SHARES,

Ranking for 7 per cent.; the Dividend on similar Shares in the Company having been 5¼ per cent. for several Years past. Also

£1000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, London, E.C., on Tuesday, Jan. 19, 1904, at Two o'clock, in Lots, by order of the Directors.

The Company, incorporated in 1853, supplies Water and Gas in Lowestoft and the surrounding District. The water-rental in 1891 was £7146, in 1902 it exceeded £14,000; and the Gas consumption has advanced from 43 Million cubic feet in 1891 to upwards of 73 Millions in 1902. New works to keep pace with the increasing demand for Water and Gas are necessary; and it is for these works that the New Capital is being raised.

Particulars of Sale, and Form of Instructions for the Auctioneer or Secretary to purchase for Investors unable to attend the Auction, obtainable post free of the SECRETARY of the Company, 137, London Road, LOWESTOFT, and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

SHREWSBURY GAS LIGHT COMPANY.

DESIRABLE INVESTMENT.

THE Directors of the above Company invite TENDERS for

£10,000 SHREWSBURY GAS CONVERTED ORDINARY STOCK

Minimum Price of Issue, £110 per £100 Stock.

This Stock is entitled to a Standard Dividend of 5 per cent., payable half yearly; and the Maximum Dividend has been paid for many Years.

January 27, 1904, is the last day for the reception of Tenders.

Forms of Tender may be had on application to LLOYDS BANK, LIMITED, SHREWSBURY, or to the Company's SECRETARY, from whom any further Information can be obtained.

By order of the Directors,
WM. BELTON,
Secretary.

Gas-Works, Shrewsbury,
Dec. 17, 1903.

NEW RIVER COMPANY.

ISSUE OF £100,000 THREE PER CENT. DEBENTURE STOCK "C,"

Authorized by the New River Company's Act of 1893,

AND OF

£200,000 THREE PER CENT. DEBENTURE STOCK "D,"

Authorized by the New River Company's Act of 1897.

NOTICE is Hereby Given, that the Directors are prepared to receive TENDERS for the above ISSUES, bearing Interest at Three per Cent. per Annum and redeemable at par at any time after the expiration of 25 Years from the date of issue upon Six Months' previous Notice being given by the Company.

Particulars, Conditions of Sale, and Forms of Tender may be obtained at the Company's Office, Rosebery Avenue, Clerkenwell, E.C.

Sealed Tenders are to be delivered at the New River Office not later than Ten o'clock a.m., on Thursday, the 14th of January, 1904.

The Reserved Price, below which no Tenders will be accepted, will be fixed early in January.

N.B.—On the transfer, pursuant to the Metropolis Water Act, 1902, of the Water Undertaking of the Company to the Metropolitan Water Board, these Debenture Stocks will, under the provisions of that Act, be secured on the whole Water Fund of the Water Board, and have, in addition, the security on the rates provided by the Act.

The Stocks are a lawful investment for Trustees.

By order of the New River Company,
JAMES SEARLE,
Clerk.

New River Office, Rosebery Avenue,
Clerkenwell, E.C., December, 1903.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER,
Gas Engineers' Agents and Contractors for METERS, FIRE-CLAY GOODS, OXIDE OF IRON, AND ALL OTHER GAS APPARATUS.
Inquiries Solicited.
Telegrams: "DARWINIAN, MANCHESTER."
Telephone 1806.

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.
QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
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HEATHCOTE GAS COAL.
Rich in Illuminating Power and yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.
THE GRASSMOOR CO., LD.,
CHESTERFIELD.

THE "ROTARY" STATION METER.
Efficiency Demonstrated.
APPLY—
T. G. MARSH,
MAWSON CHAMBERS, DEANSGATE, MANCHESTER.

THE PETROLEUM GAS SYNDICATE
Supply and erect Complete Installations of their
PETROGENE PATENT GAS PLANT
On SALE, HIRE, or ROYALTY.
PETROGENE GAS is the most suitable Illuminant for all Towns, Villages, Factories, Institutions, &c., where a Cheap and Efficient Lighting System is required. It is equally suitable for Heating and Power purposes, and may be used with ordinary Gas Fittings, Stoves, Engines, &c. It may also be used in conjunction with Coal Gas, and affords Gas Companies a ready means of increasing their output without the expense of additional storage.
The Syndicate is prepared to entertain offers of sale of small Gas-Works, whether profit earning or not.
Offices: **28, Victoria St., Westminster.**
Works: **10, Rochester Row, S.W.**

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,
Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts, and Covers, and rendering Leakage impossible.

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GAS AND CANNEL COAL MERCHANT,
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GLASGOW.

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Manufacturers of
FIRE-BRICKS, LUMPS, TILES, GAS RETORTS,
And every description of Fire-Clay Goods.
RETORTS CAREFULLY PACKED FOR SHIPMENT.

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MANUFACTURER OF
HIGH-CLASS LATHES
For Sliding, Surfacing, Screw-cutting, and Plain Turning. Milling Machines, Planing Machines, Slide Rests, Chucks, &c.

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INTENSIFIED SYSTEM BURNERS
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PATENT LAMPS for INTERIOR LIGHTING.
Suitable for
Foundries, Offices, Show-Rooms, Shop Lighting, &c.
Can also be made as Ventilating Lights for Public Halls and Private Rooms.

Can be adjusted to suit any Quality of Gas.

The highest efficiency yet obtained from Low-Pressure Incandescent Gas Lighting without mechanical aid.

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Our full Catalogue is now ready, illustrating various Designs of our Patent System up to any Power for Private and Public Lighting.

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Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

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Prices and Analysis of all the Scotch Cannels on Application.

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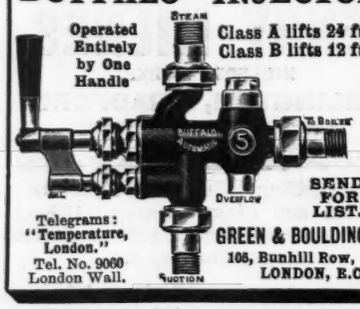

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Class A lifts 24 ft.
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STEEL OF ALL DESCRIPTIONS.
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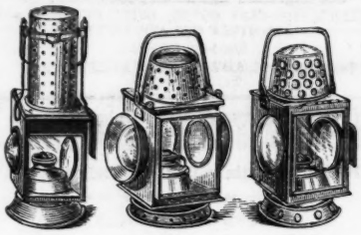
ARMSTRONG'S PATENT
CANDLE SAFETY LAMPS.



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43, MANCHESTER STREET, GRAY'S INN ROAD, W.C.

THE PERFECT MANTLE COY.
1c, Aldgate Avenue, London, E.C.
MANUFACTURERS OF THE WELL-KNOWN
SUPERIOR "PERMCO"
MANTLE, IN COTTON AND RAMIE.

Under Welsbach Licence. Can be used legally with any Burner.
Trade Price 26s. 6d. per Gross.
Reduction for Quantities.

WELDON MUD
FOR
GAS PURIFICATION,
For use in the
RECOVERY OF SULPHUR,
Also Removal of last Traces of
SULPHURETTED HYDROGEN
in catch position.

Full Particulars on application to the Patentees:
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UNEQUALLED.
Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

THE PATENT
"BEACON" GLOBE LAMP.

Largely adopted by many Local Authorities for Public Lighting, being absolutely Shadowless and Wind-proof.

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Surrey Engineering Works,
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Telephone 1693 HOP.
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HIGH-CLASS
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GUARANTEED.
GENERAL GAS AND WATER WORKS CONSTRUCTORS.
MAINLAYING.
Plans & Particulars—**J. & H. ROBUS, Engineering Contractors,** **LONDON & GORING.**

NOTICE

Re "SICLOPS" High-Power LAMPS.

The attention of our Clients, **Messrs J. & W. B. SMITH,** has been called to an advertisement of Messrs. Moffat's Limited, in which they allege that they are the owners of Letters Patent No. 14,553 and No. 23,222 of 1900, and that they have commenced proceedings for infringement of these Patents against **Messrs. J. & W. B. SMITH** in respect to their sale of **"SICLOPS" LAMPS.**

THIS IS TO GIVE NOTICE, that our Clients welcome this action, which they are defending, and that **we have received instructions to defend,** at our Clients' expense, any action for infringement of the said Patents which Messrs. Moffat's Limited may bring against anyone on account of the sale of the **"SICLOPS" LAMP.** In the event of any such action not being successfully defended by us, **our Clients will indemnify against damages.**

J. & M. SOLOMON,
58, Finsbury Pavement, E.C.
Solicitors for Messrs. J.& W. B. Smith.

No. 7126.

THE "SICLOPS"

HIGH-POWER SELF-INTENSIVE

GAS-LAMPS

ARE THE MOST

SIMPLE, EFFECTIVE, ECONOMICAL AND IMPROVED LAMPS ON THE MARKET.

Smaller Size will be Ready Shortly.

IF YOU ARE IN THE MARKET FOR

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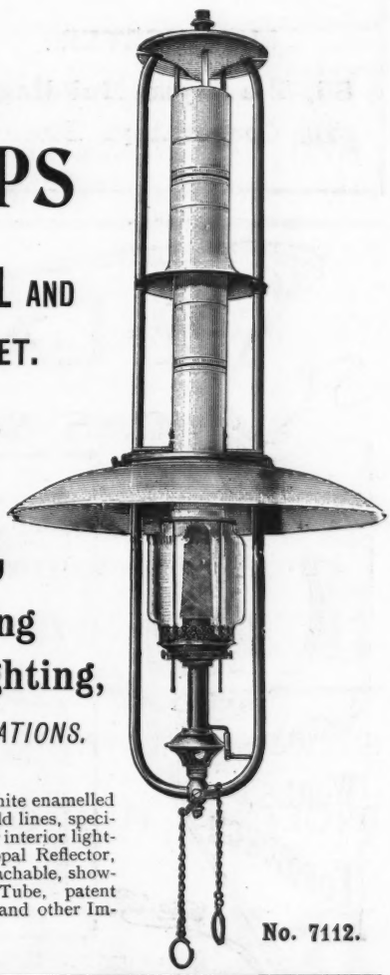
WRITE US FOR CATALOGUE AND QUOTATIONS.

700 c.p. ARC Lamp showing special lowering arrangement of globe, designed for outside work; is enamelled iron throughout; sage green colour, relieved with permanent gold lines; of the best workmanship; quite wind and storm proof.

700 c.p. Lamp, white enamelled with permanent gold lines, specially constructed for interior lighting, with 22-inch opal Reflector, which is easily detachable, showing Telescopical Tube, patent Burner Regulator, and other Improvements.



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Lose no time in Writing for a Copy of our New Illustrated Catalogue

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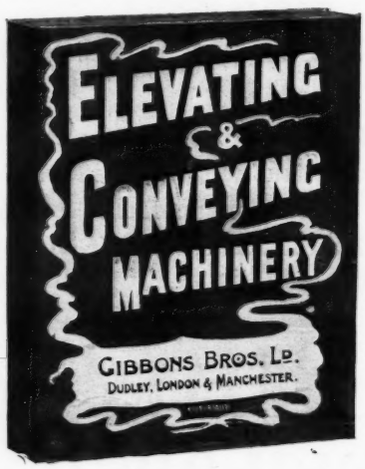

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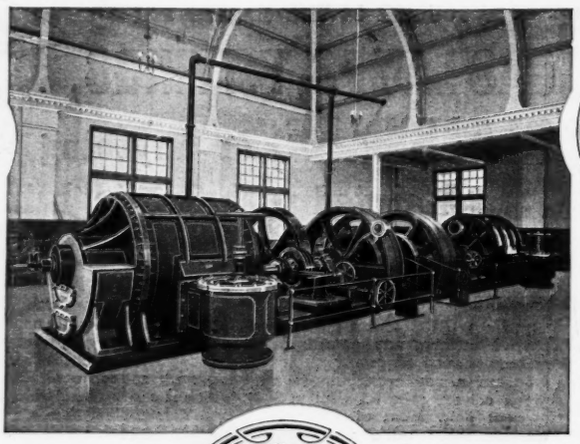
R. LAIDLAW & SON, LIMITED
GAS & WATER ENGINEERS,



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TWO EXHAUSTERS EACH TO PASS 750000 CUB. FT. PER HOUR AT 60 REVOLUTIONS PER MINUTE DRIVEN BY TWO GAS ENGINES

AND INTERMEDIATE FRICTIONAL GEARING, ERECTED AT GRANTON GAS WORKS FOR EDINBURGH & LEITH GAS COMMISSIONERS.

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STEEL SCOOPS
FOR
RETORT CHARGING.
Scoops supplied with or without handles, and of any dimensions or shape required.

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DRY-LUTE PURIFIERS
USE TIME WISELY
BY ADOPTING
Clapham's Patent Automatic Rapid Fastenings and "ECLIPSE" Rubber Joint,
WHICH SAVE MONEY.

CLAPHAM BROS., LTD.,
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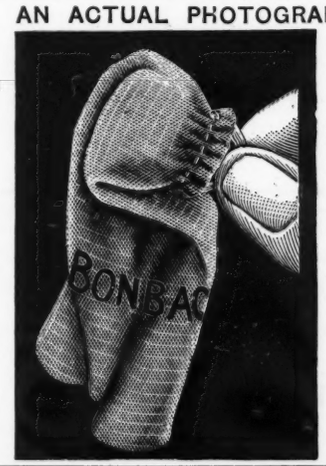

"BONBAC" MANTLE
After it has been burned off and doubled up, proving its superiority over all other Mantles.
Special Prices to Gas Companies and Lighting Authorities.

WHOLESALE FITTINGS COMPANY
80, Commercial Road, London, E.

JOSEPH CLIFF & SONS
INCORPORATED IN
THE LEEDS FIRE-CLAY COMPANY, Ltd.,
Wortley, LEEDS.

LONDON OFFICES & DEPÔTS:
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Machine-Made Retorts

Have been made in large quantities for the last twenty years; and during the whole of that time have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.
Retorts carefully Packed for Export.
Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

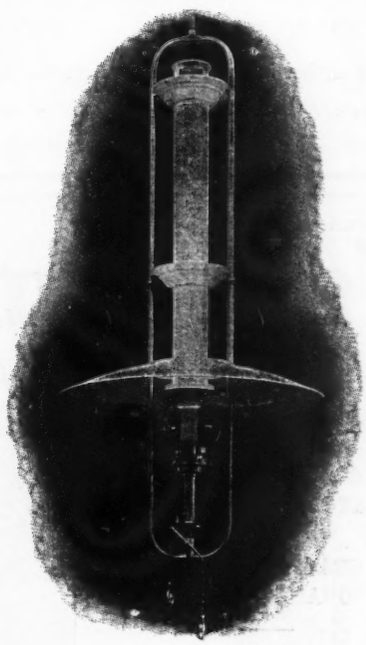
BEWARE INFRINGEMENTS.

THE *LUCAS*
GAS-LAMPS.
FOR
Indoor & Outdoor Lighting.

ECONOMY.
Over 40-Candle Power per Cubic Foot.

EFFICIENCY.
200, 400, 700, or 1000 Candle Power.

SIMPLICITY.
No Compressing Plant or High Pressure.



ON VIEW AT THE SHOW-ROOMS OF

JAMES MILNE & SON,
LIMITED,

AT
133, George Street, EDINBURGH,
111, St. Vincent Street, GLASGOW,
59, Farringdon Street, LONDON,
34, Wellington Street, LEEDS,
OR AT
Milton House Works, EDINBURGH.

Published Weekly

THE LUCAS LIGHT RECORDER

Price 0d

Issued in the interests of the Gas Industry and the finest high-power Gas Lamp known

No. 22.] [*Tuesday, January 5, 1904.*

Brevities

By the courtesy of Mr. Thomas Glover, we are enabled to give a few particulars of a notable Lucas Light installation which has been effected by the British Gas Light Co., Ltd., at Norwich. The gloom reigning formerly over Davey Place has given way to the brilliant light of six 700 c.p. Lucas Lamps. The installation, made experimentally by the Gas Co., proved a complete success, and the Davey Place tradesmen marked their approval by co-operating to pay the annual rental for the whole of these Lamps.

We are further informed by the Atmospheric Gas Co., Ltd., of Leeds, that this firm has carried out important installations of Lucas Lights at Messrs. Hathorn, Davey, and Co., Ltd., and Messrs. Campbells and Hunter, Ltd., two well-known engineering firms, and others at Messrs. Rowntree's, Ltd., and Messrs. Hotham and Whiting's. A number of Exhibitions have been wholly or partially lighted by Lucas Lamps, such as the Grocery Trades Exhibition, 1902, the York Gas Exhibition, 1903, the Northallerton Gas Exhibition, 1903, the Shipley Gas Exhibition, 1903, the Leeds Cattle Show (over 50 lamps), the Leeds Motor and Cycle Show, and the Exhibition of the Sanitary Institute, Bradford, 1903. Of other places, where the Lucas Light has been adopted, may be mentioned the Station Approach, York, Leeds Colosseum, and a trial installation of 1000 c.p. lamps in Leeds market. Many other important Lucas Lighting schemes have been completed by this wide-awake firm, for lighting shops and factories, but the above notes will give some idea of the progress in Leeds.

Telephone No. 103. Telegraphic Address: "ELEVATOR, HASLINGDEN."

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ENGINEERS, HASLINGDEN, NR. MANCHESTER.

COAL AND COKE ELEVATORS & CONVEYORS.

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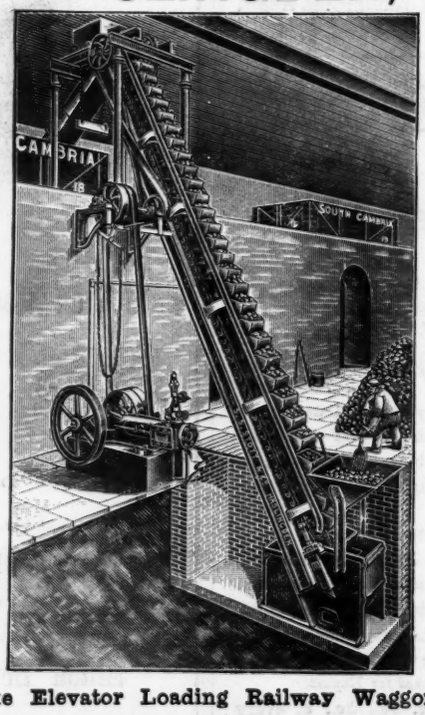
ELEVATORS & CONVEYORS for BOILER-HOUSES.

STAMPED AND RIVETED STEEL ELEVATOR BUCKETS.

DETACHABLE CHAINS AND SPROCKET WHEELS.



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LIME AND OXIDE ELEVATORS & CONVEYORS.

HIGH-CLASS STEAM-ENGINES up to 1000-Horse Power.

PUMPS, HORIZONTAL AND VERTICAL, SINGLE, DOUBLE, or THREE-THROW, for WATER-WORKS, &c.

BEAM PUMPING-ENGINES.

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F. C. SUGDEN & Co.

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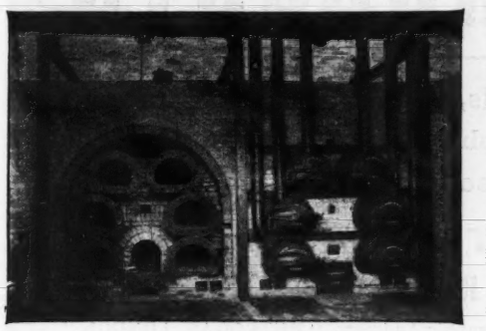

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REGENERATOR & GENERATOR SETTINGS

DEEP, SEMI-DEEP, AND SHALLOW.

Maximum Make per Ton and Mouthpiece.

Minimum Fuel Consumption.

NUMEROUS REPEAT ORDERS

Have been received for each of the above types of Settings.

RESULTS GUARANTEED. RETORTS RESET.

SOLE MAKERS OF **CRIPPS' PATENT CHIMNEY.**

Designs and Estimates on application. 28, EAST PARADE, **LEEDS.**

6348

GAS BRACKETS FOR INVERTED BURNERS

DESIGNED and MANUFACTURED by

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JAMES MILNE & SON, LTD., EDINBURGH. LEEDS. LONDON. GLASGOW.

THE SILICA FIRE-BRICK COMPANY,

OUGHTIBRIDGE, NEAR SHEFFIELD

Established 1858. The First Manufactory of Silica and Dinas Fire-Bricks erected in England.

MANUFACTURERS OF

SILICA FIRE-BRICKS

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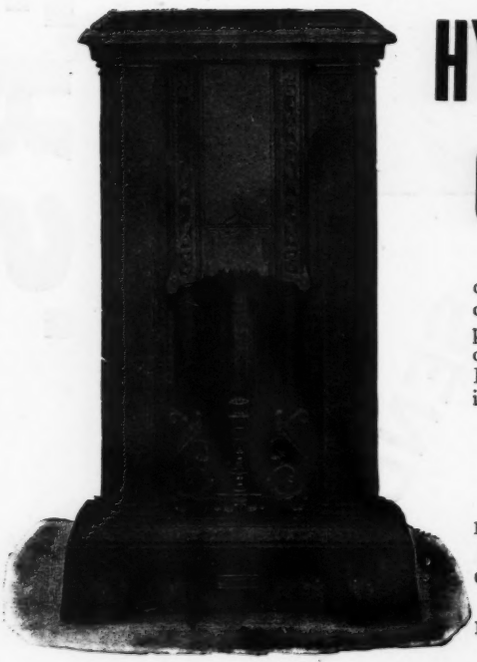

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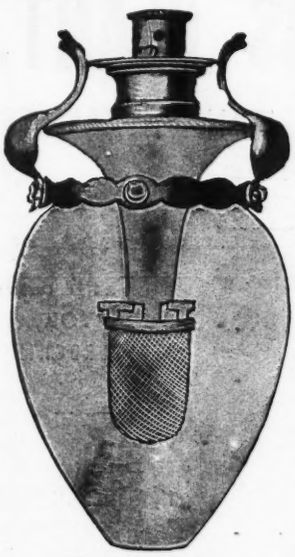

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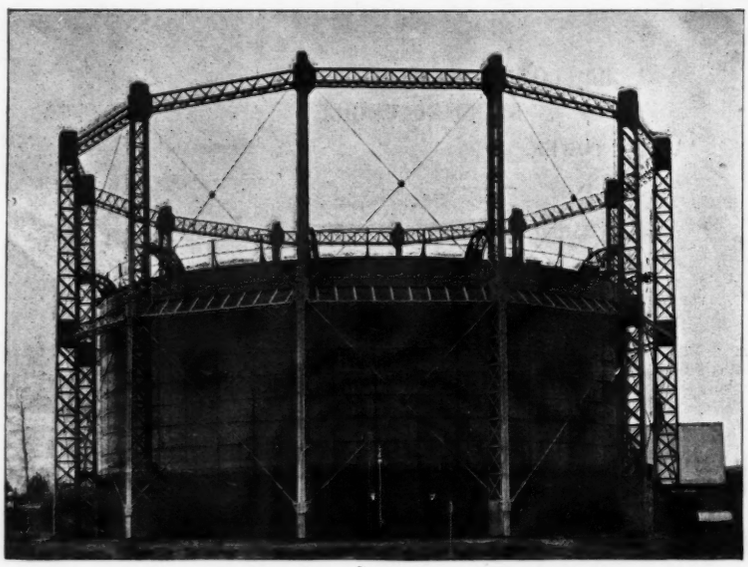

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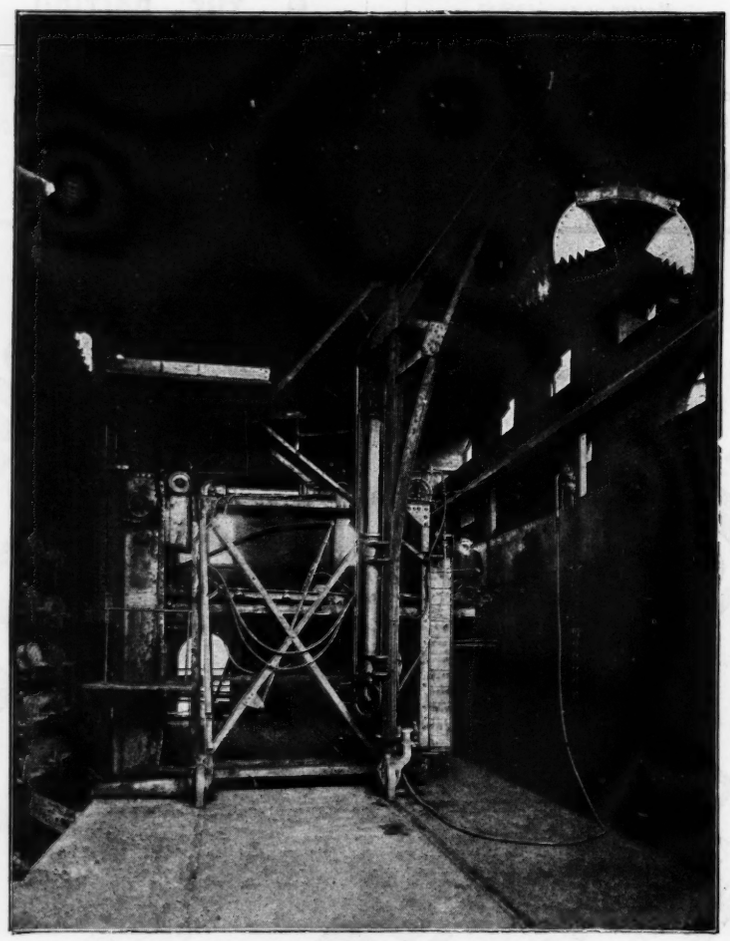

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